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# AMERICAN JOURNAL of PHARMACY

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A Record of the Progress of Pharmacy and the Allied Sciences

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No. 3

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# THE AMERICAN JOURNAL OF PHARMACY

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## EDITORIAL

### OLD BOOKS AGAIN

SOMEONE has written that we cannot look forward with hope and with faith unless we can look backward with love and with charity. And so, when over the pages of musty old books, we browse with satisfaction, it is no wonder that our respect for the development of man is much enlivened. History breeds a regard even where it fails to bring a lesson.

Not meaning at all to be trifling—but transcribing some ancient medical and pharmaceutical history into a more modern style how interesting is it to read as follows:

Dr. Avicenna (*Jour. Arab. Med. Assoc.*, June 989) writes that

“The value of a drug is better determined by giving it to a human being rather than to a cat or a goat.”

Page the Pharmacologists and Vivisectionists!

Dr. Galen (*Arch. of Dermat.*, Rome, September, 164 A. D.):

“Red wine is excellent in treating fresh wounds. Better for an old wound—and especially for burns is soured wine.”

Quite recently vinegar or soured wine has been suggested as a brand new idea in the treatment of burns.

*Bagdad Blade*, Saturday, July 4th, 881 A. D.:

“Dr. Rhazes, of the Department of Health, who has been charged with building the Sesquicentennial Hospital, commemorating the 150th anniversary of the building of the City, insists that South Bagdad is no place wherein to build a Hospital. This he proved to the satisfaction of a large group of physicians and scientists by hanging in sixteen separate places in the city, small pieces of fresh calves' liver. The place where the meat putrefied

the least rapidly was in the neighborhood of the Haroun-el-Raschid Boulevard in North Bagdad; and here Dr. Rhazes recommended that the Hospital be constructed."

*Ibid.*, Friday, April 1st, 882 A. D.

"The splendid Sesquicentennial Hospital of Bagdad rises in majesty on Bagdad Bay, down in the Southern portion of our beautiful city; a fine testimonial to the wisdom and sense of service of our city fathers."

As it was in the beginning—so shall it be, it seems, forever.

*Continens* (a medical journal edited by Dr. Rhazes, publishes these excerpts of a graduation address given by Dr. Isaac Judaeas in the Year of our Lord 892, at the Annual Commencement Exercises of the Cairo Chirurgical College:

"The chief task of the physician is to prevent disease. The majority of diseases are cured by nature."

"The more you demand for your treatment and the more highly you esteem your cure, so much higher will you stand in the eyes of the people. Your art will be held of no account by those whom you treat without fee."

"Visit not the patient too often, nor remain too long, for it is only the fresh encounter that gives pleasure."

Over a thousand years ago were these statements pronounced—yet how pertinently they apply to current medicine.

From the writings of Herodotus, a contemporary of Hippocrates, we draw a contradiction to the widely prevalent idea that ours is the Age of Specialization—whereby the doctors have come to know more and more about less and less (and college students to know less and less about more and more). He speaks thus of the Egyptian physicians of the fifth century:

"Medicine is practiced among them on a plan of separation—each physician treats a single disorder—and no more. Thus the country swarms with medical practitioners, some undertaking to cure diseases of the eye, others of the head, others again of the teeth, others of the intestines and some which are not local."

The telegram sent by Caliph Omar to his field marshal, Amru, in reply to his night letter requesting instructions regarding the disposal of the Alexandrian Library, might as well have been dispatched with slight paraphrase, from Dayton, Tennessee:

"If the records agree with the Koran, they are superfluous—burn them; if they contradict it, they are damnable; in either case—burn them."

Read the following, and marvel how much more modest have our advertisers become. Quite naïvely, indeed, does the reading notice of an ancient Celtic hair restorer suggest its miraculous qualities:

"With mice fill an earthen pipkin, close the mouth with clay and let it be buried beneath the hearth-stone, but so as the fire's too great heat reach it not. So be it for one year, at the end of which take out whatever may be there. For baldness it is great. But it is urgent that whoever shall handle it have a glove on his hand, lest at his fingers ends the hair come sprouting forth."

In his splendid book, *Four Thousand Years of Pharmacy*, Professor LaWall refers to the Arabian hospitals of the eleventh and twelfth centuries—when Europe groped in darkness—as being highly developed and organized. One of them is described as follows:

"It possessed four courts, each having a fountain in the center; lecture halls, isolation wards and out-patient dispensaries were found. Among the most novel attractions was a hall where musicians played day and night and another where story-tellers were employed for the benefit of those who suffered from insomnia. Each patient, upon being discharged from the hospital as *cured*, received some gold pieces that he might not be obliged to attempt hard labor at once."

Picture a patient leaving a modern hospital with any money on his person.

And so we repeat once more, that the art of the ancients was in knowing *how* and not *why*.

And so, too, do we again commend to those who would wisely fill leisure with reading—that in the ancient writings, or in the modern interpretation of ancient history, will be found much that is comforting and reassuring—and much, too, to disprove the existence of the mythical "Good old days."

IVOR GRIFFITH.

## ORIGINAL ARTICLES

## THE ROMANCE OF COOKERY\*

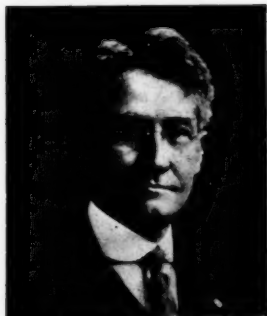
By Charles H. LaWall, Dean of Pharmacy

"We may live without poetry, music and art;  
We may live without conscience, and live without heart;  
We may live without friends; we may live without books;  
But civilized man cannot live without cooks.

He may live without books—what is knowledge but grieving?  
He may live without hope—what is hope but deceiving?  
He may live without love—what is passion but pining?  
But civilized man cannot live without dining."

—Owen Meredith.

LET US SUMMON to our aid upon this occasion the Greek host Amphitryon and the Roman goddess of good cheer, Adephagia, and let us spend an hour in the discussion of Aristology, the art of dining, and all that that implies.



Charles H. LaWall

All students of gastronomy prefer laboratory work to theory, but upon this occasion I shall act as a Barmecide host, and you must summon all your fortitude or I shall be compelled to make a hasty exit after having tantalized your gustatory emotions to the bursting point, for even as far back as Homer we hear of "the sacred rage of hunger."

Man as an animal has to eat to live, but as an omniverous epicure he frequently lives to eat. Our troglodytic forbears were the gastronomic pioneers of the world. We can conceive of them as being neither polite in their table manners nor finicky as to their fare. What we call today a "cannibal sandwich" may have been popular then, with less likelihood of its being misbranded. Even as late as the time of the Roman conquest of Great Britain the Scots were alleged to be *anthropophagi*. An *anthropophagus* resembles a philanthropist in that both love their fellow man; the former, however, loves him as the

\*One of a Series of Popular Science Talks given at the Philadelphia College of Pharmacy and Science, 1927-1928 Season.

principal course at dinner. Perhaps that's why we hear so many stories about the closeness of the Scotch—their ancestry was so concentrated. It reminds us of the story of Queen Liliuokalani, who boasted that she had English blood in her veins, and not without some degree of truth, if you understand exactly how she meant it.

But how shall we start this feast of seasoning and flow of saliva? I know that you are anxious, for of Puritanic stock is the diner who does not sneak a surreptitious look at the menu as he unfolds his napkin, even though his neighbor may be discoursing in his ear about the fourth dimension or some such unrelated subject, and tonight, alas! we have no printed menus. Instead of *a la carte* you will have to be content with *table d'hôte*. And what is more, you will take pot luck. This expression, still used today, is not interpreted as literally as its original significance.

In the old days the great family cooking pot was always kept suspended over the fire in the ample fireplace, from the familiar pot-hook. Anything and everything edible was thrown into this pot. When mealtime came, the family and guests fished for themselves, and what they might happen to get was "pot luck." I hope that each of you tonight may carry away a portion to his or her liking, and that none of you will suffer from mental indigestion afterward.

**THE BEGINNINGS  
OF COOKERY** Nobody, I believe, will challenge the statement that "man is the only cooking animal," although Carlyle made an unsuccessful attempt to contradict it in his *Sartor Resartus*. The *ars coquinaria*, as the Romans called the art of cooking, has been traced by archaeologists to our European ancestors of some tens of thousands of years ago, for by a detailed study of the debris of the kitchen middens of neolithic ages we can reconstruct, in part, the dietary habits of *Homo Neanderthalensis* and compare them with *Homo sapiens* or *Homo stultus* of the present. We know that from the earliest time man was omnivorous and that both shellfish and game were important items of his fare.

When and how he learned to utilize heat in making his food more palatable and more digestible is a secret of the past. Charles Lamb's explanation in his classic "Dissertation on Roast Pig" is as good as any other, so let us agree upon that as a starting point.

In the Golden and Silver Ages the ancient poets painted the fabled past as a period of vegetarianism. It remained for the Bronze Age to inaugurate a flesh diet, according to these same authorities. It

is not quite settled among Biblical students as to whether or not the antediluvians were vegetarians. Those who hold the affirmative of this view quote the admonition of the Lord to Noah, "Every moving thing that liveth shall be meat for you, even as the green herb have I given you all things." Well, Moses made a few revisions in the dietary pharmacopœia of the Hebrews some time thereafter and laid down arbitrary and emphatic regulations regarding foods that are followed by the orthodox Jews even unto this day.

One of the most noted of cooked dishes in biblical history is the pottage of red lentils which had been prepared for Jacob, and which was so fiercely coveted by the hungry Esau, weary and faint from hunting, that he sold his birthright for a helping of it and changed the history of the Jewish race. It is said that Rabbi El Bassam, a celebrated Jewish theologian and commentator on the Talmud, spent



"Meat" (in Ecclesiological Symbolism)  
From an Old MS.

fifteen years in vainly trying to discover the name of the cook who had prepared this wonderful dish. Perhaps he did it so that the descendants of Esau could enter suit against the sons of Jacob for damages with accrued interest.

The most noted vegetarian of biblical history was Nebuchadnezzar, the mighty King of Babylon, who subsisted on a diet of grass for seven long years. From him have probably descended the large number who dislike spinach at the present.

#### SPARTAN DIET

It is probable that primitive man ate but once a day. Even in the earlier days of classic Greece this custom prevailed and it is said that Plato reproached the Sicilians with being gluttons because they had two meals a day. In Spartan days meat was eaten only infrequently, and the principal diet was a mys-

terious concoction called "black broth." Apropos of the reputed palatability of this pabulum, a Sybarite, after tasting it said, "I am not astonished that you Spartans are so fearless of death on the battlefield, since anyone in his senses would rather die than be compelled to live on such execrable food." This coarse and unlovely food of the Spartans must have given them qualities of endurance, for it is a matter of historic record that the Sybarites were conquered and enslaved several centuries before the Spartans came under the Roman domination.

Cadmus the Phoenician, who is reputed to have originated the Greek alphabet, is said to have been the cook to the King of Sidon. This is not to be considered as conclusive proof that he invented alphabet noodles, however.

It is probable that the Greeks learned much concerning cookery from the Orientals and passed it on to the Romans. Wherever the Greeks obtained their alimentary inspiration, there must have been an almost inexhaustible source of supply, for Athenæus of Naucratis, a Greek grammarian and litterateur of the third century A. D. has left as his sole legacy to fame a work called the *Deipnosophistæ*, which is concerned almost entirely with banquets, dining, and amusements connected therewith, for the modern cabaret is not new but is a "throw-back" to the most ancient periods of which any record exists.

Athenæus' monumental work is in fifteen volumes and he quotes from eight hundred authors and twenty-five hundred separate works. Again we lament the bibliothecal bonfires kindled by Mohammedan and Christian bibliophobes of Alexandrian and later periods. Athenæus was a contemporary of Heliogabalus, one of the most luxurious living and dissolute of the Roman emperors, who contributed some novelties in the banqueting line which we shall discuss later.

Aristophanes mentions a famous dish in his comedy "Ecclesiazione," which contains mussels, two kinds of fish, brains, sauces piquante, herbs, honey, larks, doves, pigeons, poultry, rabbit heads, hares and wine. This veritable "one piece dinner" is said to have a name which is the longest in any language.

Lucullus, Vitellius and Geta were all predecessors of Athenæus, as was also Cleopatra with her famous feast at which she is said to have sacrificed a valuable pearl to add to the cost of the dinner. It is said that Cleopatra had prepared a banquet for Anthony, the obvious costliness of which had excited his astonishment. When Anthony expressed his surprise Cleopatra is said to have taken a handsome

and valuable pearl which she dissolved in vinegar before him, and drinking to the health of the Roman triumvir said, "My draught to Anthony shall far exceed it." This is a good story, and will probably go on rolling down the ages, in spite of the fact that vinegar would not dissolve a pearl so promptly, and the story is doubtless as mythical as the tale of Cleopatra's death by the bite of an asp.

Cleopatra has been described as a frail, fragile, febrile creature. As a clinging vine she certainly adorned the family tree of the Cæsars, for she was a widow of Julius Cæsar, and the mother of his son, Cæsarion, when she started to vamp Marc Anthony.

The best-paid cook in history is the one who officiated when Cleopatra played a return engagement with Anthony as host. We are not acquainted with the details of this dinner for two, but Cleopatra praised it so highly that Anthony presented the cook with a whole city, in gratitude for his services.

To go back to Athenæus for a few moments, we find some entertaining and illuminating quotations. He says of cooking:

"All books of cookery, all helps of art,  
All critic learning, all commenting notes  
Are vain, if void of genius, thou wouldst cook."

He gives a vivid picture of the responsibility of the master cook in superintending the preparation of a dinner:

"Leave, leave that ponderous ham,  
Keep up the fire, and lively play the flame  
Beneath those lobster patties; patient here,  
Fixt as a statue, skim, incessant, skim.  
Steep well this small glosiscus in its sauce,  
And boil that sea dog in a cullender;  
This eel requires more salt and marjoram;  
Roast well that piece of kid on either side  
Equal; that sweetbread boil not overmuch."

The "glosiscus" and the "sea dog" were varieties of sea food not common to modern tables, but we must agree that for the main part, this picture of more than fifteen hundred years ago is still intelligible to a gastronomist.

Athenæus also said:

"I like to see the faces of my guests,  
To feed them as their age and station claim;  
My kitchen changes as my guests inspire  
The various spectacle."

I am willing to wager that Athenæus, who was obviously a gourmet in the most complimentary sense of the word, would suffer from nervous prostration if he were exposed for a short time to the monotony of the modern hotel or restaurant menu, and a few so-called banquets or dining club luncheons of our period would send him to the insane asylum. With all their extravagances and excesses many of the Greeks and Romans of two thousand years ago had a sense of the proprieties of dining and of cookery that is often lacking at the present time.

Archistratus, another Greek culinary philosopher, wrote a poem on "Gastrology" which became the creed of the epicures for centuries. These are his opening lines:

"I write these precepts for immortal Greece,  
That 'round a table delicately spread,  
Or three or four, may sit in choice repast,  
Or five at most. Who otherwise shall dine  
Are like a troop marauding for their prey."

Dionysius the tyrant of Syracuse, who was also a gastronomist, described the perfect cook nearly twenty-five hundred years ago in these illuminating lines:

"To roast some beef, to carve a joint with neatness,  
To boil up sauces, and to blow the fire,  
Is anybody's task; he who does this  
Is but a seasoner and a broth maker.  
A cook is quite another thing. His mind  
Must comprehend all facts and circumstances;  
Where is the place, and what the time of supper;  
Who are the guests, and who the entertainer;  
What fish he ought to buy, and where to buy it."

Artemidorus, a Greek writer of the second century, published a kitchen glossary of his time, and Timachidas, another Greek, was both a cook and a poet of high renown, and composed an epopee on the culinary art, which was inspired by the soul-compelling emanations from his spits and kettles.

Before we leave the Greeks we must not forget to mention the champion gastrolator of the ancient Hellenes. Milo of Crotona, who was six times victor in wrestling at the Olympic games, carried a four-year-old heifer on his shoulders around the stadium, and then ate the whole carcass in a single day. We must not forget that the

Greeks had as their models in matters alimentary the Homeric heroes, who were neither fastidious nor dainty in their table customs. These classic exemplars prepared their repasts with their own hands. Ulysses surpassed the rest in the art of kindling a fire and laying a cloth. Patroclus drew the wine and Achilles had the responsibility of turning the spit.

**THE SEVEN SAGES  
OF GREEK  
COOKERY**

Frederick Hackwood, in a work called "Good Cheer," says "To Greece belonged the honour of producing the original seven sages of the kitchen: Orion, who invented the white sauce, and Lampridas, the discoverer of brown sauce; Nereus of Corinth, who made the conger eel a dish fit for the gods, and Agres of Rhodes, who first taught the bone method of dressing fish; Atlantus, who made the most perfect restorative, and Euthymus, who cooked vegetables so exquisitely that he was named Lentillus."

Neither should we forget the potent potion of Circe, which, while not equal to that of Nepenthe, was worth having on hand in the family medicine chest for use in emergency. This was composed of "red wine, and in it barley meal and cheese and honey, and mighty drugs withall, of which, if a man drank he forgot all that he loved."

Lucullus Ponticus, the Roman Xerxes of the first century A. D., set a new record for extravagance when he spent the equivalent of \$5000 of our present money (which must have been equal in purchasing power to many times that sum today) for a cozy little dinner for three. But when we learn that his guests were Cæsar and Pompey, we come to the conclusion that perhaps it was worth it. The Lasky's would pay more than that today just for the privilege of filming that scene.

There were three celebrated Roman epicures by the name of Apicius. One of these, who lived during the time of Tiberius, is said to have spent nearly \$4,000,000 in inventing rare dishes. Upon learning that he had only \$360,000 left of his fortune, he committed suicide rather than continue existence upon such a miserable pittance.

Macrobius was a later Roman writer whose theme was conviviality and the pleasures of the table. Petronius was an earlier Roman satirist who was Nero's *arbiter elegantiarum*. He led a life of vicious indulgence which gave him the necessary background and information for descriptions of feasts which are unsurpassed by any early author. He fell from grace in Nero's favor and committed suicide at that Emperor's behest.

**ROMAN FEASTS**

There were more gastronomic monomaniacs among the Romans than in any nation before or after. The Emperor Claudius was not content with fewer than six hundred guests at his table. Galba arose early in order not to miss breakfast, and the cost of this meal as served by him was considered extravagant, even in that period of heroic feeders. Julius Cæsar spent the income of several provinces on a single meal. Besides being an accomplished general, Cæsar was not without interest in the diversions of life and was familiar with the tripartite realm of wine, women and song.



**A Roman Banquet With Gladiatorial Combat**

Geta insisted in having as many courses in the repast as there were letters in the alphabet, and all of the viands of each course were selected so as to have names beginning with the initial letter of that course, which would put a modern chef to some considerable trouble, even with the greater variety of foods from which to choose today. Nero was accustomed to sit at the table from noon until midnight amidst the most monstrous profusion of viands and drink.

Vitellius, the friend and favorite of Nero, often spent more than the equivalent of \$15,000 on a single meal, and he usually ate four meals a day. He was an exemplar of Roman omniveristic supremacy, for he is said to have consumed a thousand oysters at a sitting by

introducing the abominable expedient of tickling the fauces with a peacock feather in order to make room for more. Even the great Julius Cæsar is said by Cato to have had some unpleasant habits, among which was that when he was invited to an unusual feast he would take an emetic to prepare himself to do proper justice to it. According to Gibbon, Vitellius spent the equivalent of six million pounds sterling on his table during the short space of seven months.

Tiberius had a most unpleasant table custom of starting an argument by asking his guests all sorts of strange questions, a sort of dinner table "Ask me another," and, in the discussion that followed, if Tiberius was worsted, his opponent was invariably asked to retire and commit suicide. This was not quite as bad as Caligula, who was in the habit of entertaining his dinner guests with private executions and the torturing of condemned criminals. One of his most grisly jokes was perpetrated on an occasion when the torturers had failed to amuse him. He rushed to the sacrificial altar attired only in a linen apron and seizing the mallet and swinging it as though he were about to slay the appointed victim, he swerved suddenly and butchered the chief executioner instead. He used to keep his dinner guests in good spirits by reminding them that he had the power to make victims of them instead of spectators.

Caligula fed his horse on gilded oats and compelled the senators of Rome to wait upon his dinner guests when the spirit moved him to that amusing diversion. Can you imagine Senators Borah and Reed waiting on President Coolidge's table?

Heliogabalus was a dinner jester of infinite variety. He loved to invite to a special dinner a number of very fat guests and then crowd them so close together that they could only perspire and not enjoy the repast. Another diversion consisted in having a large inflated couch on which his guests were invited to sit, and then in the midst of the dinner he would suddenly unexpectedly deflate this couch and tumble his reclining guests, dishes and all under the table. Mack Sennett, please take notice.

This emperor-comedian offered liberal premiums to the inventors of new sauces, but—if Heliogabalus disliked the sauce submitted, the inventor was condemned to eat of nothing else until he had discovered a condiment more pleasing to the imperial palate. On one occasion Heliogabalus had the heads of six hundred ostriches served at a banquet in order that the brains might be eaten. He also served camels' flesh at his banquets and considered camels' feet a great del-

icacy. It is doubtful whether Kipling ever thought of his "Gawd forsaken oont" as an addition to the diet of Tommy Atkins.

The Constantines had a thousand cooks. "They were accustomed to dine upon fowl from the most distant lands, fish from the most remote seas, to have for desserts fruits out of their natural seasons, and to drink foreign wines cooled in the summer snows of lofty mountains."

Maximin, one of the most despicable of the Roman emperors of the third century, made a new world's record for individual capacity as regards food. He was a giant in size, being over eight feet tall and therefore entitled to extra-sized portions. Gibbon says that Maximin drank an amphora of wine every day (about seven gallons), and consumed from twenty to forty pounds of meat a day, in addition to other comestibles.

The Roman *cocna*, or supper, was the principal meal of the day. The Roman dining-room was the *coenaculum*, was always in the upper part of the house, reached by an ample staircase. The tables were small and were changed with each course. The host and the guests reclined on couches, usually three in number (*triclina*).

The various services in connection with even the smallest dinner were performed by a number of domestic slaves. The *coquus* or cook was in complete charge of the dinner as regards its selection and its preparation. The steward at the head of the army of slaves was the *dispensator*. The purveyor was called the *obsonator*. The *vocatores* carried the invitations, and received and arranged the guests. The *cubicularii* arranged and decorated the couches and the *triclinarii* directed the repast, the dishes being carried to the table by the *depiferi* and announced to the guests by the *nomenclatores*. An attendant called the *structor* arranged the dishes on the table, after which the meats were cut up by the *scissor* or carver, who followed the rhythm of music played by unseen performers. Finally, the *procillatores* served the guests and acted as cup bearers. In some houses there was a *pragustator*, who tasted every viand before the guests were permitted to be served.

The Romans took five meals a day and ate voraciously at every one of them. Their formal feasts commenced with light food, such as eggs, and concluded with a dessert of fruit; from this custom arose the phrase "*ab ovo usque ad mala*," "from the egg to the apples," that is, "from the beginning to the end."

**WHY ROME FELL** The Romans also had a proverb "*Crapula quam gladius*," which being liberally translated, means "While gladiators have slain their thousands, eating hath slain its tens of thousands." Many reasons have been given to account for the decline and fall of Rome. Too much luxury, too much indolence, and too much bathing, have all had their proponents. The latest and most startling reason, given by E. Lucas White, in *Why Rome Fell*, is, too much Christianity. After this very brief outline of Roman cooking which I have given you, which covers many centuries, I



The Marriage Feast at Cana of Galilee

suggest as another reason "too much good eats." It is a matter of record that the legionaries of Cæsar's time, each of whom carried his whole month's rations in addition to other impedimenta, the whole totalling more than sixty pounds per man, were the best fighters that Rome ever had. From the time of Domitian on they were fed better and fought worse than ever.

Cooking is different from dietetics or nutrition. It is an art which is essential to human happiness and contentment, but whose perfection is associated with luxury, voluptuousness, and decadence. Just as ancient Rome exemplifies this latter statement, so does the

period of the frivolous French monarchs who harassed their prime ministers in order to provide funds for feasts emulating those of the Romans, whose tables had become traditions of luxuriance and extravagance. The renaissance, which was accompanied by much plain living and high thinking, was followed by the post-renaissance period of profligacy and profusion.

Catherine de Medici was probably the connecting link between these two periods. Montaigne credits her with having stimulated the revival of the art of cookery in France by importing Italian cooks into Paris. She must have inaugurated a wave of interest in cookery, for shortly after her death Sir Thomas Burton, the distinguished author of "Anatomy of Melancholy," said: "Cooking is become an art, a noble science; cooks are gentlemen." There must have been a flareback in England also shortly after this time, for John Taylor said in 1630: "God sends meat and the Devil sends cooks."

#### FINGERS AND FORKS

The Italians had undoubtedly done for cookery during the Dark Ages what the Arabs had done for letters and for science, for the first gleam of hope came from that land in the sixteenth century when the cook of Pope Leo X invented fricandeaus and in the following century the Italians originated ices and brought the idea to France, where they became very popular. Leo X himself must have been something of an experimenter in alimentary accessories, for it is said of him that he made more sauces than saints. The Italians had also commenced the use of works a century previous to their use in France and Great Britain. It was an English traveler named Thomas Coryate who first made them known to his countrymen and stated that the custom of using a fork instead of the fingers was very general in the early part of the seventeenth century in Italy, but had not been observed by him in France, Germany, Switzerland, or in his native land. It was James I who attempted to introduce the practice of fork-using into England and who was contemptuously nicknamed *Furcifer* for so doing.

We can scarcely visualize the dinner table scene of the time of Good Queen Bess, as described by a contemporary poet:

"If the dish be pleasant, either fleshe or fishe,  
Ten hands at once swarm in the dishe;  
And if it be fleshe ten knives shalt thou see,  
Manglin the fleshe, and in the platter flee,  
To put there they handes, in peril without fail  
Without a gauntlet or else a glove of mail."

And yet this period, crude as it may seem, was far in advance of the barbarous baronial times of a couple of centuries before.

#### LIVERIES AND SOTELTIES

As early as the fifteenth century the English commenced to serve four meals a day, *viz.*, breakfast, dinner, supper and livery. The latter was a light repast of bread and beer, of sweet cakes and wine or spiced liquor served in the bedchamber before retiring. This was made possible by livery cupboards, holding small quantities of food, placed in the bedrooms. There was no need in those days for a midnight foray upon the refrigerator on the part of a hungry soul, even if there had been a refrigerator to raid.

The Elizabethan Era was the time when subtleties (spelled "sotelties") were about at the zenith of their popularity. These were devices, usually of sugar or of pastry, or sometimes of meat dishes, which not only served to adorn the table but taxed the ingenuity of the cook. At one of these ancient banquets the subtleties consisted of a pelican sitting on its nest, an image of St. Catherine, a panther, and numerous others. Even such ambitious scenes as the Fall of Troy and other episodes in history or mythology were attempted by these culinary artists.

The cooks of that time were as anxious to please the eye as to satisfy the palate. Their finest dishes were adorned with gold or silver foil or decorated with various colored powders. Among special subtleties or decorative dishes the peacock and the swan played a prominent part at this time. To quote verbatim from a description of one of these affairs:

"The peacock was skinned, stuffed with spices and roasted. While the cooking was going on a cloth continually wetted was kept continually around the bird's head to save it from the fire. When cooked it was allowed to cool and then the skin was neatly sewn on again, the tail feathers spread out, the comb gilt, and a piece of cloth dipped in spirits of wine placed in its mouth, to be set on fire while it was being served up at table, which was accompanied by some ceremonial. The serving was performed by the ladies most distinguished for rank and beauty, following the dish in procession to the music of minstrels, who placed it in front of the guest most famed for courtesy, or, if it were after a tournament, the victorious knight, who took a chivalrous oath of valour or enterprise on its head."

The swan was served in a similar regal style.

Gentlefolk at this time breakfasted at seven off bread and beef, ale and wine. Dinner followed at ten and often lasted until one. Supper generally came at four and was as substantial as the breakfast, and between eight and nine the livery or evening collation, consisting of bread, ale, and spiced wine, was generally served in bed. The original meaning of breakfast is a *break* in the overnight *fast*, dinner literally means to "un-fast," while supper is derived from the root word giving us sup, sip, soup, and sop. Lunch comes from a word meaning a lump or chunk, because it originally consisted of lumps of bread and meat.

Beaumont and Fletcher satirized the culinary extravagances of their time at some length. It remained for Ben Jonson to introduce to us the Elizabethan cook in a rhapsody which has never been equalled by any other writer:

"A master cook! Why, he is the man of men,  
For a professor; he designs, he draws,  
He paints, he carves, he builds, he fortifies,  
Makes citadels of curious fowls and fish.  
Some he dry-ditches, some motes round with broths,  
Mounts marrow bones, cuts fifty angled custards,  
Rears bulwark pies; and for his outerworks,  
He raises ramparts of immortal crust,  
And teacheth all the tactics at one dinner—  
What ranks, what files, to put his dishes in,  
The whole art military! Then he knows  
The influence of the stars upon his meats,  
And all their seasons, tempers, qualities;  
And so to fit his relishes and sauces.  
He has nature in a pot 'bove all the chemists  
Or bare-breeched brethren of the rosy cross,  
He is an architect, an engineer,  
A soldier, a physician, a philosopher,  
A general mathematician."

To carry our story across the English Channel for a change, we find that Louis XIV encouraged the beginning made by Catherine de Medici. Bechamel, whose name is still attached to a white sauce of elaborate composition, was *maitre de hotel* or chief steward of that monarch. Soubise sauce, which is made principally from onions, was devised by the Prince Soubise, who led the heroic but unsuccessful defense of Rochelle. The great Conde, also of this same period, had a cook named Vatel, whose name is immortalized among the

members of the culinary fraternity from the fact that in his chagrin and grief at the tardy arrival of a fish, which was to serve as an important course at a meal which he was preparing, he committed suicide.

Louis XV was a gourmet of distinction during whose reign the culinary art saw many innovations. Many of the special entrees and dishes on menus printed in French owe their original nomenclature to this period. Sauce Richelieu is named for the duke (not the cardinal) of that name. According to some authorities he originated mayonnaise, originally called mahonnaise, because of his celebrated



A Kitchen of the Sixteenth Century. By Teniers

capture of Port Mahon. Another explanation is that this popular salad dressing originated in Bayonne and was originally called Bayonnaise, later corrupted to the present name.

#### THE "CORDON BLEU"

The phrase "*cordon bleu*," literally blue cord or ribbon, which was applied as a term of distinction in connection with several military or holy orders, was applied to a cook for the first time during the reign of Louis XV. This epicurean monarch, having expressed his opinion very emphatically to the effect that only a man could cook to perfection, aroused the interest of Madame du Barry, who had a dinner specially prepared for the King by her woman cook (*cusinière*). The dinner was such an unqualified success that Louis XV demanded the name of

the cook in order that so valuable an artist might be added to his staff. Upon revelation of the fact that a woman cook had prepared the meal, the King, at the demand of Madame du Barry, conferred upon the artist the Royal Order of the Holy Ghost, which carried with it the *cordons bleu*, hence this phrase is now commonly applied to a distinguished woman cook.

One of the noteworthy facts of the seventeenth and eighteenth centuries is that men of eminence in the medical profession were not above writing works on cookery. Among such may be mentioned Sir Theodore Turquet de Mayerne, the father of the First London



Meats. From an Old Print

Pharmacopœia; Sir Kenelm Digby, the originator of "sympathetic powder," and John Hunter, the noted British surgeon. That cookery is not incompatible with medicine is confirmed by the fact that the Latin word *curare* not only means to cure, but also to dress a dinner.

**COOKERY CAMO-  
FLAGE**

From the very earliest Greek and Roman times one of the objects of expert cookery was to so disguise a dish that it bore no resemblance to the constituents from which it had been prepared. Bechamel, upon one occasion, is said to have used his art with such consummate skill that he dressed

a pair of His Majesty's old slippers in such an appetizing form for a banquet that all of the courtiers declared it the best dish they had ever tasted. This same culinary artist, on a certain Good Friday, served the King with a dinner apparently consisting of meat and fowl, but in reality it was a Lenten dish composed wholly of vegetables.

Another celebrated example of this kind is where the cook of one of the early Greek kings, having heard his master express his longing for a certain small fish, when the King and his retinue were on an expedition far from the waters where such fish were obtainable, succeeded in counterfeiting the fish by means of a turnip carved into the proper shape, salted, seasoned and disguised with poppy seeds, so successfully that His Majesty pronounced it an excellent fish. Some modern restaurants still possess this talent, but not intentionally in all cases, as exemplified by the patron who called the waiter back and said, "If this is coffee bring me tea, but if this is tea, bring me coffee."

Restaurants had their origin and rise in France during the latter part of the eighteenth century. The records show that in 1770 there was but one establishment in Paris which was called by that name and which functioned only for meal service and not for lodging as well, as had always been done by inns, taverns and hotels, and that within the short space of twenty-five years the number had increased to more than five hundred. The word restaurant literally means a restorer. The Latin student's etymological analysis of the word is worth quoting here. He said it was derived from *res*, a thing, and *taurus*, a bull, because it was a "bully thing."

The French Revolution gave Parisian cookery a temporary setback, but in 1804 a work was published which was the first great effort at investing gastronomy with the dignity of an art. This was the celebrated *Almanach des Gourmands*, a monumental work on cooking and dining. The word "gourmand" at that time was synonymous with "gourmet" or "epicure," and meant a connoisseur in the delicacies of the table. At present "gourmand" is usually employed to designate a greedy feeder or a glutton, while the other terms mentioned retain their original significance.

Napoleon was surrounded by a number of culinary experts. Robert, after whom the Sauce Robert was named, was a celebrated chef of this period, and he, together with Rechaud and Mérillon, were called the Raphael, Michelangelo, and Rubens of cookery. Other distinguished authorities of about this same period were Ude, Francatelli, and Soyer.

Napoleon was not a gourmet, but it is said that when on a campaign his cook had orders to put a fresh chicken on the spit every twenty minutes, in order that the Emperor might not be kept waiting when he wished to dine. It was in Napoleon's time that Carème served as cook to many noted persons, including Talleyrand, Emperor Alexander I, Baron Rothschild, and George IV.

**LAWYER AND  
KITCHENER TOO**

Brillat-Savarin (1755-1826) is the greatest name of all in the history of cookery. His *magnum opus*, the *Physiology of Taste* (*Physiologie du Gout*) was published in 1825, just before his death. The subtitle of this interesting work, which has recently been published in English with an introduction by Arthur Machen, is *Meditations on Transcendental Gastronomy*.

Brillat-Savarin was not a chef, as many mistakenly believe, but a modest French advocate or lawyer, who fled to America for safety's sake during the Reign of Terror, and who, while in this country, supported himself by giving lessons in French and playing the violin in a New York theatre. In 1796 he returned in safety to France and shortly thereafter became a local magistrate, which position he occupied until his death.

He was a member of that brilliant circle of which the nucleus was Madame Recamier, who was his friend and relative. Among the aphorisms of this brilliant and witty writer are the following:

"Beasts feed; man eats: the man of intellect alone knows how to eat."

"Tell me what you eat: I will tell you what you are."

"Drunkards and victims of indigestion are those who know not how to eat or drink."

"The most indispensable quality in a cook is punctuality: and no less is required of a guest."

"The fate of nations hangs upon their choice of food."

He also says:

"If we take a broad survey we shall discern three kinds of *cooking*: The first, which has to do with the preparation of food, has retained the original name;

"The second is applied to the analysis of food and the ascertaining of its elements, and is usually called *Chemistry*;

"And the third, which may be called restorative cooking, is better known under the name of *Pharmacy*.

"If their ends are different, they are as one in their common use of fire, furnaces, and many of the same vessels."

Brillat-Savarin adds a tenth to the nine recognized muses. He names her *Gasterca*, and says that "the delights of taste are her domain." Speaking of concentrated sauces he relates the following interesting story of the Prince de Soubise, whose name has previously been mentioned in connection with the onion sauce which still bears his name. It was as follows:

"The Prince de Soubise one day wished to hold a reception; it was to end with a supper and he sent for the bill of fare. His steward appeared at his bedside with a highly ornate card on which the first item to meet the princely eye was 'fifty hams.' 'Bertrand,' he exclaimed, 'what is the meaning of this piece of extravagance? Fifty hams! Do you want to regale the whole of my regiment?' 'No, *mon prince*; only one ham will appear on the table; but I shall still need all the rest for my dressings, my sauces, my——'

"'Bertrand, you are a thief, and I shall not buy those hams.'

"'Ah, but *mon seigneur*,' replied the artist, 'you do not know our resources! You have but to say the word and I will take every one of those offending hams and put them all together into a crystal vial no bigger than my thumb.'

"What was to be said to so hardy an assertion? The prince smiled, nodded assent, and the item was allowed to pass."

**OSMAZOME, ETC.** Brillat-Savarin pays the highest compliment to the delicacy of the sense of taste when properly cultivated. He speaks of a Roman gourmet who was able to distinguish, merely by the difference in flavor, a fish caught between certain bridges from one caught further down the river. He also tells of some of his own contemporaries who could distinguish the particular savour of a leg on which the partridge rests its weight while sleeping. He uses a term unfamiliar to us in the word "osmazome," which he says is the essential flavoring constituent of meat, and which gives the characteristic flavor to properly-made bouillon.

He also describes in detail the coffee percolator of Dubelloy, which is a landmark in the early history of percolation, soon thereafter adapted to the needs of pharmacy, where it now finds its greatest usefulness. It was probably the influence of Brillat-Savarin that

led Alexander Dumas, Sr., to write *The Grand Dictionary of Cookery*, a comprehensive treatise on the subject.

Cookery books, especially old ones, are delightful reading—except for dyspeptics. They are tantalizing sometimes, in their allurements, for they conjure up visions of new culinary possibilities and gustatorial experiences. In passing, we wonder whether a bookworm would find special enjoyment in eating its way through a library of this kind.



**The Gourmand's Library**

**SYLLABUBS—  
FLUMMERIES—  
TANSIES AND  
FOOLS**

The very nomenclature is quaint and intriguing. We read of desserts whose names have a lilting sound and are enigmatically attractive, whose very character and classification may often be inferred on onomatopœic grounds. "Almost singing themselves as they run" as the herbs in Kipling's "Fathers of Old." Syllabubs, flummeries, tansies, and fools—who would not like to top off a meal with one of these! And as for drinks—we yearn for a posset with a sippet floating in it, for a caudle, for hippocras, mead, and sack—the latter a potation whose exact identity has eluded both antiquarian and culinary research.

We crave a jugged hare or a platter of wigs. We hunger for a breakfast of frumenty and collops or a gammon of bacon or ham. We would not refuse a luncheon of cullis and salimongundy, or an olio or a frigacy or some collared or soused beef, topped off with a panada or march pain or an apple fraze or an apple pupton with bis-kits on the side. We recognize what is meant by apricocks, oringes, plummes (or plombes), and damosens. Caboché eludes for a moment until we find it directed to be boiled with ham, and sallary soop is easily intelligible. We rather doubt the statement that cocks' combs make a pretty plate at supper.

The name Battalia pie temporarily attracts us, but we lose our ardor when we learn that it is composed of chickens, pigeons, rabbits, lambs' tongues, cocks' combs and oysters. This seems to be a combination of gastronomic incompatibilities. These were the days when a jellied dessert was made from hartshorn (the shavings of the horn of the hart or deer), calves' feet being an alternative. Manufactured gelatin is less than a century old.

There seem to be no culinary tariff walls between nations when it comes to studying cook books either old or new. One must be a gastronomic cosmopolite or suffer from international indigestion. Nutritional necessities are crowded into a corner by omniverosity. There are neither radicals nor conservatives; there are only liberals. And "there were giants in those days," if we are to judge by the recipes published in Colonial times. They think nothing of directing a half peck of flour as the initial ingredient in a cake recipe, and as for eggs and butter, they seem to have used them with an entire disregard for either the pocketbook or the pylorus.

One of these older cook books where both the individual recipes and the meals assume heroic proportions when viewed in the light of our comparatively microscopic appetites, is by Mrs. Glasse. It is a "new edition," and was published in 1788. In the preface the candidate for the *cordon bleu* makes a bid for economy when she reproaches a contemporary with using six pounds of butter to fry twelve eggs, when, as she says, "Everybody knows, that understands cooking, that half a pound is enough." We shall not quote any of her recipes in detail. They are elevating as to character but depressing as to quantity. But just for an insight into the appetites of the English in the days of *Georgius Tertius*, let us scan a suggested menu of this authority. Let us take the month of January, for example. I

shall not attempt to translate the names of unfamiliar dishes; I shall simply quote verbatim:

# **JANUARY (a Dinner)**

## **First Course**

Leg of Lamb	Chestnut Soup	Boiled Chickens
Chicken and Veal Pie	Petit Patties	Roast Beef
Tongue	Cod's Head	Scotch Collops
	Raisolds	

## **Second Course**

Marinated Smelts	Vermicelli Soup	Woodcocks
Roast Sweetbreads	Tartlets	Mince Pies
Almond Tort	Stands of Jellies	Larks
Roast Turkey	Maids of Honour	Lobsters

## **Third Course**

Artichoke Bottoms	Dutch Beef, Scraped	Macaroni
Custards	Cut Pastry	Black Caps
Scalloped Oysters	Potted Chars	Stewed Celery
Morels	Rabbit Fricasee	

Need any comment be made? How could anyone here look the second course in the face, to say nothing of the third?

Mrs. Glasse was not the only one of her kind, for I have another old volume by Ann Peckham of Leeds, England, whose claim to favor as related in her preface is that the book is the result of forty years of experience with the best families in and about Leeds, and that "it is not stuffed with a nauseous hodge-podge of French kick-shaws." Let us see what Ann plans for a dinner in December. We find that Ann does not divide her dinner into courses, but instead she gives a bird's-eye view of the properly arranged dinner table for the month mentioned. Her bill of particulars names thirty-four counts in the indictment, as follows:

- |                        |                   |
|------------------------|-------------------|
| 1 Soup, fish, pheasant | 11 Wine sours     |
| 2 Broiled chickens     | 12 Teal           |
| 3 Oranges              | 13 Cheesecakes    |
| 4 Sweetbreads          | 14 Puddings       |
| 5 Shenel               | 15 Limes          |
| 6 Oyster loaves        | 16 Cherries       |
| 7 Ambassador cream     | 17 Mutton chops   |
| 8 Jellies              | 18 Dry sweetmeats |
| 9 Bacon and eggs       | 19 Veal olives    |
| 10 Woodcocks           | 20 Damsins        |

- |                   |                         |
|-------------------|-------------------------|
| 21 Apricots       | 28 Strawberries         |
| 22 Tarts          | 29 A turkey             |
| 23 Partridges     | 30 A trifle             |
| 24 Rhenish cream  | 31 A hare pie           |
| 25 Ham            | 32 Quince               |
| 26 Stewed pigeons | 33 Palates              |
| 27 Cards          | 34 Soup, fish, venison. |

Are you going down for the third time? Have you had enough? Twelve kinds of meat, three kinds of fish and shellfish, besides the eggs, fruits, puddings, creams, etc. Before you lose consciousness entirely let me whisper in your ear that Ann Peckham has no mercy on her guests, for she gives a specimen December supper which contains thirty-five items, with such trifles as boiled turkey, woodcocks, partridges, wild ducks, snipes, and venison, with custards, syllabubs, and tansies galore.

How did they do it? How did any survive to tell the tale? And remember these are not intended for banquet menus, they are just for ordinary home folks, "even as you and I."

Perhaps you think that heavy eating was an English specialty, from the foregoing examples. Think not so. In a recipe book of Queen Charlotte of Saxony, a robust ruler of the Middle Ages, to whom the kitchen was not a *terra incognita*, as it frequently is to a modern woman, even of moderate circumstances, there is a recipe for a stew which begins with the following startling sentence: "Kill a swine and hew it in pieces"—just like that. A recipe for food for an invalid was as follows: "Place a bucket of water on the boil. When hot, stir in gently forty eggs. Add sufficient honey, free from the comb, to sweeten, and two skins of Bordeaux wine." What stalwart invalids they must have been called upon to nurse back to health and happiness.

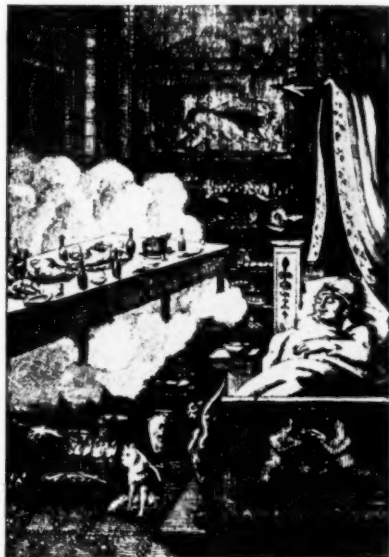
An ordinary German dinner of that period consisted of fourteen courses with nine wines, while a special dinner called for seventeen courses and sixteen different forms of liquid joy in the shape of wines, punches, and liqueurs. In all times there have been those who believed that a dinner could be properly viewed only by occasionally looking at it through the bottom of a glass.

The Germans of that time had what were called *schau-essen*, literally "show eats," which were for exhibition purposes only and not to be consumed. These were carried around the table at the conclusion of a course, or series of courses, before beginning the next

one. On one occasion of record the guests are said to have sat down at midday to a dinner of sixteen heavy courses. At six o'clock they resumed eating, with a light repast of twenty-seven courses.

**FUNERAL PIES**

Wakes, or funeral feasts, were great occasions for consuming food. The mourners at the obsequies of Prince August of Hanover in 1698 allayed their grief with twenty-one courses, each containing a choice of three dishes. In some sections of our own country funerals call forth the culinary resources of the bereaved family in looking after the physical needs of the mourners. In



**The Gourmand's Dream**

Lehigh and Berks Counties of Pennsylvania, raisin pies are called "funeral pies" because they may be baked several days before they are needed without becoming inedible. These preparations were necessary because of the sparsely settled country, and the long distances the relatives and friends were compelled to drive to the funeral.

In justice to the makers of these gigantic old-time meals, it may be that they were necessary, in many cases, by the large families, including relatives, guests and the many servants and retainers found in these households.

In cooking there are six basic operations when heat is employed in the preparation of food. They are as follows: broiling, roasting, baking, boiling, stewing, and frying. Fundamentally these operations are different in their action and their effect upon the foods subjected to them. Theoretically they are very simple. In practice they require a specialized technique for which some persons have a special aptitude and which others, alas, never acquire. It requires no great stretch of the imagination or of the memory to recollect some of the crimes that are committed in the name of cookery. A recipe, be it ever so clear in phraseology and explicit in direction, does not guarantee a perfect product in the hands of every one who follows it. One cup of butter, two cups of sugar, three cups of flour, and four eggs in the hands of one individual may yield a cake which is a toothsome marvel and the consummation of all the qualities a cake should have while a tyro or a culinary moron may produce an article suggestive of Portland cement or of Para rubber.

Instead of one hour we might spend many in the bewitching byways of the inexhaustible romance of cooking. We might spend a whole hour profitably discussing technique alone. Who has not been fascinated by the sight of griddle cakes deftly turned by the dextrous operator in the front window of a restaurant? Adroit as these individuals usually are they could scarcely compete with the wife of an early American pioneer, whose pancake proficiency was tested by her ability to toss the cake from the skillet directly up through the broad chimney and run out of doors in time to catch it coming down.

**COOKERY'S  
BYWAYS**

Then there is not only the technique of cooking alone, but that of serving and especially of carving.

Do you know that one hundred years ago there was a distinctive nomenclature for this latter art? One had to learn to cut up a bustard or a turkey, to souce a capon, to unlace a rabbit, to rear a goose, to unbrace a duck, to wing a partridge, to allay a pheasant, to wing a quail, to lift a swan, or to break a teal.

We might describe the uses of obsolete and discarded culinary utensils, such as spits, warming irons, marble mortars, trenchers, etc. We might comment upon the favorite foods and beverages of noted individuals, for the records show that Kant preferred lentils to rich foods, Goethe champagne to beer, Martin Luther beer to water, Alexander Pope loved cold sliced meat, Frederick the Great and Napoleon were great coffee drinkers, and William Morris, the poet,

thanked God for making something as strong as an onion. Haydn, the musician, was in the habit of ordering a dinner for five or six and then devouring the whole of it himself.

Even in our Mother Goose rhymes days we were made acquainted with the preferences of Little Jack Horner, of old King Cole, of the dainty dish of four and twenty blackbirds that was set before the King; of the Queen who ate bread and honey in the parlor, and in the modern classic *When We Were Very Young*, the King's desire for butter on his bread is the motif of one of the most charming jingles in the book. And who can forget the alluring labels "Drink Me" and "Eat Me" which Alice encountered in her wanderings in Wonderland. If we took the time to enumerate odd food substances and peculiar food habits we should have to devote a series of lectures to that subject alone. Brillat-Savarin says of the Romans: "Nothing was left untasted, from the ostrich to the cicada, from the dormouse to the wild boar. They left no experiment untried in their search for appetizing sauces, and successfully employed many substances, the use of which is beyond our understanding."

The catholicity of taste and the daring excursions into unknown realms of culinary possibilities is strangely lacking in our present age. The John Does and Richard Roes of the present, with all their relations, suffer from food prejudices to an amazing extent. If you don't believe it, try to introduce a new food, not a manufactured product, but a perfectly wholesome, palatable, but unfamiliar food, like the new vegetables dasheen and chayote, upon which our own U. S. Department of Agriculture spent thousands of dollars in an ineffectual attempt to popularize them a few years ago. War-time Food administrators will remember, too, that many persons would suffer the pangs of hunger rather than eat corn meal when wheat was scarce. Most Americans who travel stop at American hotels in foreign lands and rarely have an opportunity or even a desire to try new foods.

He who would really enjoy foreign travel must be able to eat in all languages. Foreign dishes, like books in a foreign language, lose something by translation into another culinary tongue. There is a society in France which has for its primary object the introduction of new foods and new dishes to its members. It is called the "*Societe Nationale d'Acclimation*," and its annual banquets afford the members an opportunity to try rare foods and unusual combinations.

In all times and in all climes there have been a few daring souls

engaged in pioneer work of this kind, and subsequent generations call them blessed. The tomato and the potato were long looked upon with suspicion by the *hoi polloi*; now they are indispensable articles of our daily dietary. One of the earliest of such societies was called the "Meduse" and was formed in Marseilles, France, during the seventeenth century. There have been societies, too, whose avowed object was the consumption of abnormal quantities of food. In one of these, which existed in France in the eighteenth century, the eligibility rule for membership was the ability to eat for three hours continuously. An outgrowth of this was another society called the *Grands Estemacs* (literally "great stomachs"), whose annual dinners started at six P. M. and lasted until the following noon.

We might multiply instances from history of inordinate individual capacity for food. In this connection one is reminded of the story of an individual who called himself "Egbert the Egg King," who was proud of the accomplishment of being able to consume, at a single sitting, three dozen hen eggs, two dozen duck eggs, and one dozen goose eggs. An agent for a vaudeville circuit called upon Egbert and offered him a place on the circuit. He called Egbert's attention to the fact that he would have to appear twice daily, to which Egbert readily agreed. When the agent, however, mentioned that on holidays there would be four performances, Egbert demurred. "There is one thing that I want clearly understood," he said, "you must arrange your schedule so that I will have plenty of time for my meals."

We might spend an hour more taking a "cooks' " tour through the fascinating domain of geographical gastronomy. Here we could discuss Philadelphia scrapple and pepperpot, Baltimore terrapin, Southern fried chicken, Boston baked beans, Virginia beaten biscuits, not to mention chop suey, schnitz und knopf, spaghetti, goulash, curry, gefüllte fisch, English plum pudding, and many other comestibles, the very enumeration of which unconsciously starts the early mechanistic stages of salivary and gastric digestion.

One of the hampering influences of culinary progress in our times is the development of "food faddism." Here we enter the lunatic fringe of culinaphobia, vegetarianism and many other fanatical beliefs and practices. This is not the romance of cookery, it is rather melodrama or tragedy, especially for those who are trying to reduce, and we shall pass it by in silence.

The English have a saying "to dine with Duke Humphrey," which means to go without dinner altogether, the relevancy of the quotation being found in the fact that Duke Humphrey was starved to death in the Tower. Tonight you have dined with Duke Humphrey. I hope you have not suffered overmuch. Whether we call it aliment, diet fare, feed, fodder, food, forage, nourishment, nutriment, pabulum, provender, regimen, sustenance, viands or victuals, we find it playing a great part in human history and in human happiness. Whether one studies astronomy or gastronomy one simply must eat, whether one eats simply or not. Let me close by quoting from an inscription in a cook book sent as a gift:

"Instead of teaching wives to shoot  
As in the modern day;  
Doc 'Wiley's' maxim 'Feed the brute,'  
Is much the better way."

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## PHYTOCHEMICAL NOTES†

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### No. 98. THE SEEDS OF NEPETA CATARIA

By Samuel M. Gordon\*

THROUGH the kindness of Mr. Van Sickle, who had become interested in the cultivation of the labiates in the Pharmaceutical Garden, a quantity of "mint" seeds, which proved to be those of *Nepeta Cataria*, were placed at the disposal of the Pharmaceutical Experiment Station. Inasmuch as the amount was greater than could be used for garden purposes, the opportunity suggested at least a preliminary chemical examination of the seeds. The seeds are practically tasteless and odorless.

A moisture determination, carried out by means of the xylene method, revealed the presence of 7.5 p. c. of water. Incineration yielded 1.53 p. c. of water-insoluble ash, 4.11 p. c. of water-soluble ash, hence 5.64 p. c. of total ash.

†From the Laboratory of Edward Kremers.

\*Work done in 1925 as Wrigley Fellow.

Extraction with selective solvents yielded the following amounts of extracts:

Petroleum ether	22.90 p. c.
Ether	0.45 " "
Alcohol	10.25 " "

The petroleum ether extract which was olive-green in color, no doubt, consisted principally of fatty oil, having the following properties:

$d_{25}^{\circ}$	0.7391
$n_D^{25^{\circ}}$ (Abbé)	1.4802
Sap. No. (butyl alc. as solvent)	183.9
Iodine No. (Wijs' method)	103.

Exposed on a watch glass, a small amount solidified after several days.

The ethereal extract was a dark green resin. The alcoholic extract was a hard, brown, shiny mass. Being primarily engaged with other work, this examination was not extended.

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## PHYTOCHEMICAL NOTES†

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### No. 99. THE ALDEHYDES OF *PINUS JEFFREYI*

By Samuel M. Gordon\*

**T**HE OIL DERIVED from the oleo-resin of *Pinus Jeffreyi* is of special phytochemical interest on account of its large content of normal heptane, about 98 p. c. of the oil being made up of this hydrocarbon. On this account it has served as the source of pure heptane for the study of this hydrocarbon and of reactions that take place in its solution.<sup>1</sup>

The composition of the remaining 2 per cent. is to a large extent still unknown. A fuller knowledge of this portion seems

†From the Laboratory of Edward Kremers.

\*Work done in 1925 as Wrigley Fellow.

<sup>1</sup> E. Kremers, *J. A. Pharm. Assoc.*, IX, 857, 860 (1920), and X, 1 (1921).

necessary to an understanding of the formation of the hydrocarbon in the plant. Such a study would require large amounts of material, which unfortunately are not readily available. It may be further pointed out that the seeds of *Pittosporum resiniferum* also yield heptane, the genesis of which may be related to that of the aldehydes, formed by cleavage of the fatty acids contained in the seeds.<sup>2</sup>

Schorger<sup>3</sup> was the first to examine the oil for constituents other than heptane. He suspected the presence of citronellal. However, on account of the small amount of oil available, the identity of this compound was not established. A further investigation by the chemists of Schimmel & Company<sup>4</sup> did not confirm the presence of this aldehyde. They found instead normal decylic aldehyde, linalool and possibly methyl chavicol. However, no details are reported.

The present report deals with an examination of the "Nachlauf" from about fifteen gallons of crude oil from the oleo-resin. Evidence was found for none of the compounds, excepting possibly decylic aldehyde. There was found in addition nonylic aldehyde and 1- $\alpha$ -pinene.

### Experimental

Approximately five and a half liters of the last fractions from the steam rectification of 15 gallons of Jeffrey pine oil were made available for examination. Of this about five liters distilled at 97-98°, the boiling point of heptane. The remaining half liter was subjected to several fractionations with the final results as recorded below:

TABLE I.

Fraction	Temp.	Vol. in cc.	Density
1	98-110/760 mm.	77.0	0.6899
2	110-125	58.0	0.7061
3	125-135	11.0	0.7232
4	135-150	18.0	0.7488
5	150-165	130.0	0.7999

<sup>2</sup> Cp. the formation of  $\alpha$ -anethol by destructive distillation of castor oil.

<sup>3</sup> A. W. Schorger, *J. Ind. Eng. Chem.*, 5, 971 (1913).

<sup>4</sup> Report of Schimmel & Co., April, 1915, p. 45.

Fraction	Temp.	Vol. in cc.	Density
6	165-180	93.0	0.8277
7	60-65 /5 mm.	55.0	0.9306
8	65-75	11.0	0.8129
9	75-80	9.0	0.8258
10	80-85	11.0	0.8776
11	85-90	7.5	0.8994
12	90-95	5.0	0.9104
13	95-100	1.5	—
14	100-110	3.0	0.9257
15	110-120	5.0	—
16	120-130	2.0	—
17	130-140	0.5	—
18	140-150	2.0	—
19	150-160	1.0	—
20	160-	—	—

The above table is illustrative of the complexity of the material in hand. Each of the fractions yielded decidedly positive results with Schiff's reagent<sup>5</sup> and rapidly reduced ammoniacal silver nitrate. Accordingly each of the above fractions was treated with an equal volume of 30 per cent.  $\text{NaHSO}_3$  for removal of aldehydes.

Fractions	Gms. $\text{NaHSO}_3$ Compound	Gms. re-generated aldehyde <sup>6</sup>	$d_{24}^\circ$	$n_D$
A. 98-150/760 mm.	0.9	—	0.9077	1.4239
B. 150-165	4.0	1.2	0.9072	—
C. 165-180	4.8	1.3	—	—
D. 60-85/5 mm.	3.0	1.0	0.9069	—
E. 85-120	3.0	1.0	0.9069	1.430
F. 120+	0.9	—	—	—

The aldehydes were optically inactive. Attempts were made to determine the boiling point by the capillary method. The results, however, were very indefinite.

<sup>5</sup> The test with Schiff's reagent gave beautiful violet colors, which may indicate small amounts of citral. Cp. Power and Chestnut, *J. Am. Ch. Soc.*, 44, 2940 (1922).

### Analysis for Sodium

Fraction	Gms. NaHSO <sub>3</sub> Compound	Gms. Na <sub>2</sub> SO <sub>4</sub> yielded	Percent- age of Na
A.	0.0968	0.0305	10.20
	0.1034	0.0324	10.14
B.	0.2472	0.0753	9.83
	0.3114	0.0951	9.69
C.	0.2707	0.0830	9.93
	0.3266	0.1041	10.32
D.	0.1368	0.0395	9.35
	0.1474	0.0428	9.40
E.	0.1897	0.0526	8.97
	0.2202	0.0605	8.92

Percentage of Na calculated for:

C <sub>6</sub> H <sub>13</sub> CHO.NaHSO <sub>3</sub>	11.38 p. c.
C <sub>7</sub> H <sub>15</sub> CHO.NaHSO <sub>3</sub>	10.64 p. c.
C <sub>8</sub> H <sub>17</sub> CHO.NaHSO <sub>3</sub>	10.00 p. c.
C <sub>9</sub> H <sub>19</sub> CHO.NaHSO <sub>3</sub>	9.82 p. c.
C <sub>10</sub> H <sub>21</sub> CHO.NaHSO <sub>3</sub>	8.91 p. c.

These results indicate that the aldehyde may be octylic, nonylic, decylic or undecylic aldehyde or mixtures thereof. This assumption was partly confirmed by the attempted preparation of a semicarbazone, also upon analysis of the silver salts of the acids resulting on oxidation.

Attempts to prepare a semicarbazone yielded only liquid products, no longer possessing the aldehyde odor. This in part confirms the presence of several aldehydes, as mixtures of several depress the melting point, in this case even below the solidification point.

Prior to oxidation, as described below, the aldehydes were regenerated from the liquid semicarbazones by treating with an aqueous solution of oxalic acid and subsequent distillation. The distillate was extracted with aldehyde-free ether, the ethereal solution dried over anhydrous sodium sulphate, and the ether evaporated.

The aldehyde thus recovered was oxidized by heating in a pressure flask with 50 cc. of chromic acid mixture<sup>7</sup> at 90° for fifteen minutes, with occasional shaking. After cooling, the contents of the

<sup>6</sup> The aldehydes were regenerated by treatment with NaHCO<sub>3</sub> and steam distillation.

<sup>7</sup> Bertram and Walbaum, *J. prak. Chem.*, 45, 599 (1892).

flask were extracted with aldehyde-free ether, washed with water, 10 p. c. sodium bicarbonate solution and finally with water until neutral. The ether solution was dried over anhydrous sulphate, and the ether evaporated; the last trace being removed by aspirating with nitrogen. The residual acid was steam distilled, the distillate neutralized with a saturated solution of barium hydroxide and the filtrate boiled to remove carbon dioxide. The hot liquid was then treated with a 5 per cent. solution of silver nitrate. The precipitate was filtered and dissolved in a large volume of water and allowed to cool. Two fractions were thus obtained, and directly analyzed after drying at 100°.

## Frac. 1.

0.0133 gms. substance yielded 0.0054 gms. Ag. = 40.60 p. c.  
0.0232 " " " 0.0093 " " = 40.09 " "

## Frac. 2.

0.0215 gms. substance yielded 0.0093 gms. Ag. = 43.25 p. c.  
0.0125 " " " 0.0054 " " = 43.20 " "

## Calculated for

$C_8H_{17}COO$  Ag 40.42 p. c. Ag.  
 $C_9H_{19}COO$  Ag 43.00 " " "

Hence the aldehydes found are nonylic and decylic aldehydes and the results confirm those obtained from the analysis of the sodium bisulphite products.

## Identification of 1-a-Pinene

After removal of the aldehydes with sodium bisulphite the lower fractions (98-180°) were again distilled, this time over sodium. The fractionation yielded, besides a large amount of heptane and several cubic centimeters boiling between 110-150°, the following two fractions:

<i>B. p.</i>	<i>Volume</i>	$d_{24}^{\circ}$	$n_D$	$\alpha_D$ (5 cm. tube)
150-165° (742 mm.)	100 cc.	0.8015	1.4410	—1.90
165-180° (742 mm.)	55 "	0.8286	1.4510	—1.45

These figures indicate pinene, the presence of which was confirmed by the preparation of nitrosochlorides melting at  $102.5^{\circ}$  C. The amount isolated from 20 cc. of the oil was too small, however, to convert it into nitrolamine bases.

Fraction  $165-180^{\circ}$  was also tested for limonene by means of bromine. That a compound containing only one unsaturated linkage was present, is seen by the amount of bromine taken up.

4.1652 gms. in 20 cc. acetic acid required 1.7 cc. Br.<sub>2</sub> or 5.1 gms.

Calculated for $C_{10}H_{16}$ 2 F	9.8 gms.
$C_{10}H_{16}$ 1 F	4.95 gms.

Hence this fraction consists of pinene or a similarly related body.

### Summary

A "Nachlauf" of the oil from *Pinus Jeffreyi* was found to contain two aldehydes, octylic and nonylic and l- $\alpha$ -pinene.

Whether the presence of pinene is indicative of the natural occurrence of this hydrocarbon in the species, or whether its presence is due in this instance to a very slight contamination with the oil of another species of *Pinus*, cannot be determined from the data at hand. Great care had evidently been exercised in the collection of the oleo-resin as was shown by the fractionation of the oil as obtained from California and as is further revealed by the small terpene fraction obtained upon the fractionation of the residue. The question of hybridization, it has been learned, is to be taken up by the Bureau of Forestry. If proven, this might account for the presence of much larger amounts of terpenes. Even if the volatile products of the oleo-resin of *Pinus Jeffreyi* consist to the extent of 98 p. c. of heptane, there are no biological or phytochemical reasons why this plant should not produce terpenes as well as do most of the other species of this genus.

**THE PROGRESS OF PHARMACY IN CHINA IN 1927**

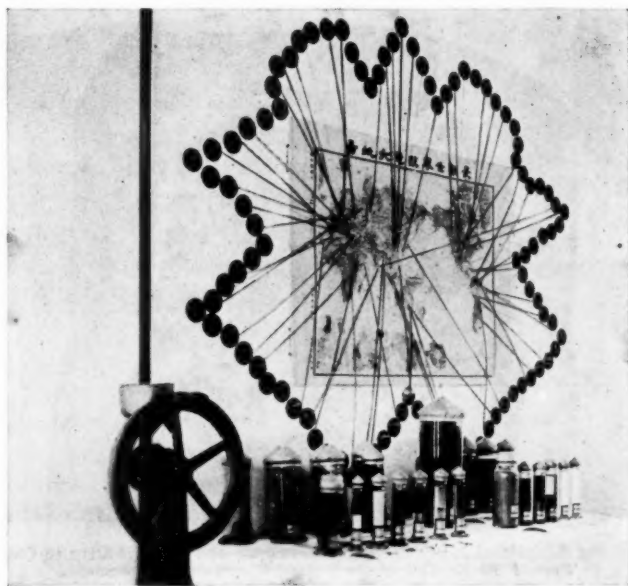
By John Cameron, Ph. C., F. C. S.\*

**D**URING THE YEARS that we have been resident in China we have been privileged to meet people of many nationalities—some who like ourselves are resident in this country and many who have been passing through China on a world tour or tour of the Far East. We have been impressed most by American visitors. We have found that they have perhaps shown more interest in China and things Chinese than any other country's nationals. During 1925-26 it was our privilege to visit most, if not all, of the leading manufacturing chemical houses of the United States. We found them all, almost without exception, keenly interested in China as a possible market for their goods—especially their packed goods. We therefore feel that there must be many American pharmacists who are interested in China in a general way and perhaps who are interested in China pharmaceutically in particular. Our many pharmaceutical friends in the United States who write to us from time to time requesting particulars about some phase of pharmacy or pharmaceutical training in China have prompted us to sketch briefly the progress of pharmacy (if any) during the past year in this country.

The history of pharmacy in China is naturally very closely associated with the history of medical education in this country, and the story of medical education during the past year has been unfortunately a sad story of the closing down of many hospitals and medical schools throughout the country owing to the disturbances which originated in Canton and spread from there to Nanking, Hankow, Wuhan, Changsha and up the Yangtze River. In each of these cities we have named there were young Chinese being trained in elementary pharmacy in the pharmacies attached to hospitals—mostly mission hospitals. In many of the upper Yangtze cities and towns the hospitals unfortunately were looted. In Nanking our friend Dr. George Hadden was busy with his first classes in the Institute of Technology teaching young Chinese to become dispensers; we will not call them pharmacists, because that would be a misnomer. The Institute of Technology was founded about two years ago by the China Medical Associa-

\*Member Pharmaceutical Society of Great Britain, Member American Pharmaceutical Association; Pharmacist, Peking Union Medical College, Peking, China.

tion for the training of hospital technicians and dispensers. This work was the outcome of many appeals from hospitals scattered throughout the country for trained laboratory assistants and trained dispensers who could be placed in charge of the smaller hospital pharmacies and who could be trusted to compound ordinary prescriptions accurately and prepare solutions for operating room and out-patient department requirements. During April or May, 1927, the trouble spread to Nanking, and Hadden was forced to abandon his Institute; the school was closed and all the students scattered. Hadden is now



Part of Exhibit by Peking Pharmaceutical Society. World Map in Chinese With Small Circular Discs and Silk Cords Showing the Habitats of Various Commonly Used Drugs. Tablet Machine (Eureka) in Foreground. The Glass Jars Contain Chaulmoogra Oil in Various Stages, Showing the Steps in the Preparation of Ethyl Esters of Chaulmoogra Oil.

in Australia. Whether this college will be opened at some future date depends entirely on the political (or military) situation in this country. The need for such a college must be apparent to even casual observers of affairs in China; the lack of one makes it almost impossible for many of the smaller mission hospitals to function properly. It is to be hoped that the situation in this country will change soon, that some stable form of government will arise out of the present chaotic conditions and that this college in Anking will be reopened at

some not far distant date for the sake of the progress of pharmacy in China.

The towns along the Yangtze Valley, previous to the anti-foreign outbreaks of early 1927, were good customers for American pharmaceuticals of all kinds. Since then there must have been a tremendous falling off in trade along this river. Many American business houses who had branch depots in Shanghai have felt the slump severely, and unfortunately in some cases they have decided to close their agencies in China altogether.



Showing Samples of Many Inorganic Chemicals and Drugs Native to China,  
Part of the Exhibit of the Peking Pharmaceutical Society.

*Shanghai*—In Shanghai, the largest city in China and the chief seaport of the Far East, there are naturally many foreign pharmacies. We were rather disappointed to find that the Chinese assistants in these retail pharmacies were not properly trained; they could dispense prescriptions, but had no chemical background which would have enabled them to understand scientifically what reactions were taking place in the mixtures or solutions they were dispensing. In all the foreign owned and managed pharmacies we visited we found young foreigners in charge of the dispensing counters—usually young men who had just graduated from college in their own country and had come out to China on a two or three years' contract to experience the joys and sorrows of life in the Far East. In no case did we find a Chinese

assistant in complete charge of the dispensing of all prescriptions. There were many Chinese assistants in all the businesses visited and we were impressed with the length of service of some of these in the same business—usually the chief Chinese assistant had been in the business from ten to twenty years—but their experience was limited to the same shop all the time. There are some well-equipped Chinese-owned and managed pharmacies in Shanghai—the chief assistants there are usually American-trained Chinese—but they are very few and far between and ultimately they become proprietors of pharmacies and spend their energies supervising the strictly business side of retail pharmacy and leave the ethical or more scientific side to some member of their staff.

We know of only one Chinese pharmaceutical concern in Shanghai who have entered the wholesale chemical field. In 1926 we had the pleasure of inspecting their stall at a big medical conference held in Peking and their products compared very favorably with the other foreign exhibitors.

We hesitate to venture any criticism on the foreign owners and managers of pharmacies in Shanghai, but we feel from our own experience in Peking that it should be possible to train Chinese assistants in pharmacy in such a way that they may be given complete control not only of the more potent drugs in the pharmacy but of the stock of narcotics as well. We have found from experience that young Chinese who come to a pharmacy with some elementary training in chemistry and who spend four or five years in a busy pharmacy, such as our own here, if they receive some additional training in volumetric analysis, materia medica and pharmaceutical chemistry during their term of service, are well qualified to accept responsibility in any pharmacy in China and are reliable assistants. We pass on this hint to the foreign proprietors of pharmacies not only in Shanghai but in all the larger cities of China in the hope that they may be stimulated to take a more active and lively interest in their own assistants.

It is not a very difficult matter to train an assistant in the way he should go; true, it takes time, but surely it is time well spent, and if these managers could only realize the service they would be rendering pharmacy in China in particular and world pharmacy in general by placing some well-trained Chinese pharmaceutical assistants on the China market, we feel convinced they would consider the time spent in training them well spent. As we see the pharmaceutical situation in China today—unless foreign pharmacists in this country spend some time training their assistants in the various branches of pharma-

ceutical practise, there is little hope for the formation of a Chinese Pharmaceutical Society in the present generation. Early in 1927 the British Chamber of Commerce in Shanghai published an abridged copy of the British Pharmacopœia 1914 in Chinese—"For the use of physicians, pharmacists and students in China and the Far East with Therapeutical Notes." This publication was translated from the original by Dr. C. L. Kao.

In this Journal<sup>1</sup> we printed the suggested constitution of the Peking Pharmaceutical Society in 1925. This society came into being in 1926 and it has been the one bright ray amidst the gloomy pharmaceutical darkness of this country.



Table Filled With Pharmaceutical Books, the Largest Book Exhibited Was the United States Dispensatory. Note the Three Interesting Pharmaceutical Scrolls With Very Old Chinese Characters. The Glass Jars Contain Specimens of Chinese Drugs.

The president of the society is Mr. Moody Meng, Ph. C.—the only Chinese holding the major qualification of the Pharmaceutical Society of Great Britain. The secretary is Mr. C. T. Feng, a co-worker with Dr. K. K. Chen (now of Johns Hopkins Medical School). The treasurer is Mr. W. H. Tu, one of the few graduates in pharmacy who have received all their training and experience in China. The society is entirely Chinese, although foreign pharmacists are permitted to become ordinary members. During 1927 meetings have been held bimonthly, with the exception of the hot summer months of June and July, and these meetings have been well attended. At one meeting per month only the Chinese language is used, and in this way many Chinese pharmacists who do not speak or understand English suffi-

<sup>1</sup> *AM. JOUR. OF PHARM.*, October, 1925.

ciently well to follow a lecture are brought under the influence of the society.

It is quite a common thing to find American, German and British pharmacists sitting alongside their Chinese friends at the meetings of this society—quite an international group.

Situated as it is in Peking, the society has been fortunate in having some very interesting speakers during the year.

During November and December, 1927, the following pharmacists addressed the meetings of the society:

- (1) Mr. J. Stranack, Ph. C. (Mulford's Far Eastern Manager), on "Pharmacy in South Africa Today."
- (2) Mr. J. Gardiner, Ph. C. (China Inland Mission business manager), on "Pharmacy and Things Pharmaceutical in Australia."
- (3) Dr. Sung, a Chinese Pharmacist trained in America, on "Pharmacy in the United States."
- (4) The writer, on a "Review of British Pharmacy in 1927."

It will be seen from these lectures that world pharmacy—not Chinese pharmacy—is what these young Chinese are interested in. Besides these lectures there have been some highly scientific discussions on such subjects as

- (1) "Ephedrine and Pseudo-Ephedrine."
- (2) "Endocrine Substances."
- (3) "Cod Liver Oil."
- (4) "Precious Stones in China."

The Seventh Biennial Conference of the National Medical Association of China was held in Peking this year 1928 from January 27th till February 2d. The Executive Committee of this conference requested the Peking Pharmaceutical Society to arrange a scientific exhibition of Chinese drugs—or of drugs and chemicals which were native to China and which might be used in place of imported drugs. This exhibit proved very popular with conference visitors, judging by the number of signatures which appeared in the visitor's book.

As very few Chinese medical men have actually seen tablets being prepared, it was decided to take our small hand tablet-making machine to the exhibit and allow the conference visitors to make themselves a few soda mint tablets; these they were allowed to take away with

them. This may account in some measure for the popularity of the pharmaceutical exhibit.

Mr. C. T. Feng (the secretary of the Peking Pharmaceutical Society) displayed specimens of various Ephedras and had an excellent show of the various stages in the preparation of Ephedrine and pseudo-ephedrine with some very fine crystalline specimens of various salts of Ephedrine which were greatly admired by all conference visitors. He also displayed ethyl esters of chaulmoogra oil with the various stages of preparation from the chaulmoogra nut to the finished product. Another feature of the exhibit was Tissue Fibrinogen prepared by Mr. Feng. This substance is now largely used in the P. U. M. C. to arrest hæmorrhage.

There was a display of over sixty books (Chinese and foreign) dealing with pharmacy or some branch of pharmaceutical practise. The president of the society had the happy thought of having a world map with the names of the countries printed in Chinese; around this map small circular green-painted discs were neatly arranged. On these discs in Chinese and English were painted the names of various commonly used drugs and from the discs to their habitats were silken-colored threads—a small arrow head pointed to the usual source of the drug mentioned on the disc.

During the conference a morning session was given over to the Peking Pharmaceutical Society and the following papers were read:

M. Meng, Ph. C.—Chair.

C. T. Feng—Secretary.

J. C. Liu, M. Sc.—A Review of the work that has been done on Chinese drugs.

W. H. Tu, Ph. G.—“Cod Liver Oil.”

C. T. Feng—“Biuret Reaction” as applied quantitatively and qualitatively to Ephedrine Mixture (demonstration).

Moody Meng—“Pharmaceutical Aspect of Endocrine Substances.”

This is the first time, so far as the writer knows, that there has been any official recognition given to pharmacy in China, and it was a fortunate chance that there was a pharmaceutical society in being which could put on an interesting and instructive display at this important medical conference.

LIST

Copper  
Ferrous  
Os Sep  
Borax  
Arsenic  
Calcium  
nate  
Kaolin  
Talc  
Mercur  
Sodium  
Calome  
Sulphur  
Yellow  
Oxide  
Mercur  
Yellow  
Oxide  
Sandara  
Galanga  
Nutmeg  
Cubeb  
Camphor  
Senna I  
Aconite  
Cardam  
Licorice  
Liviticun

For the benefit of readers of the American Journal of Pharmacy we append a list of the inorganic chemicals and drugs which were displayed at the pharmaceutical exhibit. We list these under their English name and give a Romanized Chinese name and the actual cost per pound (Lb.) of these items in Peking—purchased from Chinese drug stores. The Yuan dollar is the official currency in North China and is approximately equal to \$0.50 gold.

LIST OF DRUGS EXHIBITED IN THE SEVENTH BIENNIAL NATIONAL MEDICAL CONFERENCE IN PEKING, CHINA

Name	Chinese Name	Price Per Pound Yuan Currency	Name	Chinese Name	Price Per Pound Yuan Currency
Copper Sulphate	Lu Tan Fan	\$ 0.40	Gentian Root	Lung Tan Tsao	0.40
Ferrous Sulphate	Tan Fan	0.15	Rhododendrin	Nao Yang Hua	0.60
Os Sepiæ	Hai Piao Hsiao	0.30	Cantharidis	Pan Mao	0.20
Borax	Pei Pen Sha	0.40	Cassia Bark	Jao Kuei	0.20
Arsenic	Pai Hsien	1.20	Aloes	Lu Huai	0.60
Calcium Carbo- nate	Ku Fen	0.10	Bitter Almond	Ku Hsiang Jen	0.30
Kaolin	Kao Ling Fu	0.20	Sweet Almond	Tien Hsing Jen	0.80
Talc	Hua Shih	0.20	Castor Seed	Hu Ma Tze	0.10
Mercury	Shui Yin	2.00	Yellow Sandal Wood	Tan Hsiang Mu	1.20
Sodium Sulphate	Pi Hsiao	0.20	Cloves	Ting Hsiang	1.50
Calomel	Ching Fen	2.40	Star Anise	Ta Liao	0.40
Sulphur	Lu Huang	0.20	Fennel Fruit	Hung Hsiang	0.32
Yellow Lead Oxide	Me Tue Tseng	2.00	Galls	Wu Pei Tze	0.30
Mercuric Sulphide	Yin Chu	4.00	Rhubarb	Ta Huang	0.60
Yellow Mercuric Oxide	Sheng	4.50	Sweet Flag	Chang Pu	0.30
Sandarac	Pei Yuan Hsiang	1.20	Gallnut	Ping Lang	0.50
Galangal	Kao Liang Chiang	0.20	Opium	Ya Pien	24.00
Nutmeg	Jao Kou	1.20	Iris Root	Pai Chih	0.40
Cubeb	Pi Teng Chih	0.60	Nux Vomica	Ma Chien Tze	0.30
Camphor	Chang Nao	2.00	Castor Seed	Ta Ma Tze	0.10
Senna Leaves	Pa Tien Yeh	0.40	Crategus	Shang Lu Huang	0.10
Aconite Root	Tsao Wu To	0.40	Menthol	Po Ho	17.00
Cardamom Seed	Tiao Kao	2.00	Marshmallow Root	Shu Kuei	0.10
Licorice Root	Kan Tsao	0.60	Taraxacum Root	Pu Kuang Yin	0.10
Liviticum	Tan Kuai	0.80	Peppermint	Puei Ho	0.10
			Spearmint	I Kuang	0.10

The need for trained Chinese pharmacists is becoming more urgent. Chinese medical graduates are finding it difficult to have their prescriptions properly dispensed except in the foreign-owned or managed pharmacies and with the spread of western medicine in China there is an increasing demand by the medical profession for qualified Chinese pharmacists. We were requested to address the conference on "Pharmaceutical Education in China," and we suggested that something should be done in the near future with a view to establishing a college of pharmacy in some of the larger cities of China where young Chinese could be taught the elementary principles, at least, of pharmaceutical practise. We pointed out that there would be no lack of students, if such a college could be erected and properly equipped. During 1927 we ourselves have had more than one hundred applications from young Chinese who were anxious to study pharmacy and take the diploma in pharmacy which we give.

Unfortunately, our space in the pharmacy here is very limited and we can only take a handful of students at one time, and as our course in pharmacy is a four years' course we cannot hope to supply the needs of even the province of Chihli let alone China.

The following resolutions (amongst others) were passed by the National Medical Association of China at their biennial conference in Peking:

"RESOLVED, That the National Medical Association of China respectfully call the attention of the government to the great hindrance to the future development of science and medicine in the country if the educational institutions are to be called upon to pay luxury taxes on the importation of scientific apparatus and material.

"RESOLVED, That representations be made to the government to take up the compilation and publication of a Chinese Pharmacopœia.

"RESOLVED, That a committee be appointed to confer with the representatives of the China Medical and Pharmaceutical Association on the question of the amalgamation of the two associations."

## THE PHARMACIST AND THE PUBLIC HEALTH\*

By Hugh S. Cumming

Surgeon General, U. S. Public Health Service

THE USUALLY strategic position and the familiar association of the drug store with medical matters in the popular mind places pharmacists in a position to render a material service to the community in connection with public health activities. It is the privilege as well as the duty of a pharmacist to co-operate with public health agencies in the dissemination of reliable information concerning the public health, and to assist the constituted public health authorities especially as relates to communicable diseases and the protection of biologic products. It is, therefore, evident that a pharmacist should possess information of wider scope on matters pertaining to the public health than is possessed by the average layman.

Health officers generally have recognized that health education is an important means for promoting public and personal health. Broadly speaking, public health in a given community depends upon the personal health of each individual. To give information on any subject to everyone in a community is a tremendous task, and one that can never be finished. It has no end because new facts are being constantly developed through research and new people are being added to each community through new arrivals and the growth of children to the teachable age. Those who are trying to promote health education for the public have, therefore, the task of imparting an ever-increasing mass of information to an ever-changing population.

The magnitude of such a task, instead of being a cause for pessimism should be a challenge to persons interested in the public health to develop a plan whereby each community may feel a sense of responsibility for the important task of health education. Members of the profession of pharmacy can play an important part in the matter of health education.

The facts for health education are developed by the laboratory workers, those engaged in scientific research of all kinds, the field workers in epidemiology, the vital statisticians, who keep the record of progress, and those clinicians who are close observers of their patients.

\*Public Health Bulletin No. 1.

Every person should have a working knowledge of what he should expect in the way of health education from his physician, dentist, pharmacist, and nurse, and from the local health organization. In addition to this, he should know what an intelligent and well-organized State Department of Health may do for the promotion of the health of the citizens of the State, and what may be expected from the Federal Government in the way of health conservation. In order that the pharmacist may measure up to his responsibilities in the matter of the demands for health information, he must, of course, be properly informed with regard to such matters.

The editors of the *Journal of the American Pharmaceutical Association* and of the *Journal of the National Association of Retail Druggists* have kindly offered space in their columns in which public health information may be furnished to members of the profession of pharmacy throughout the country. It is possible that other publications reaching pharmacists will also utilize such information. The Public Health Service is glad to have the opportunity of bringing to the members of the profession of pharmacy from time to time matters pertaining to the public health that are of importance or of current interest.

When health information has become more general we should be near to the dawn of a new era in health education; when the citizen develops a sense of responsibility for his own health he will be in a position to demand competent and adequate service from all health authorities. He will also be in a position to be critical of the kind of service he receives and demand that such service should approximate in efficiency the result which it is possible to achieve with weapons against disease which science has placed in our hands. Then the value of right living and personal hygiene will be understood and appreciated as well as the true benefits conferred by safe water supplies, safe milk, proper disposal of sewage and excreta, the value of birth registration and disease reporting, the control of communicable diseases, and the health promotion value of school hygiene, industrial hygiene and scientific research.

The public, generally, is rapidly awakening to the possibilities of preventive medicine due to the tremendous volume of publicity on health matters that has developed within the past few years. It will be well, however, to remember that the circulation of misinformation by individuals and unrecognized organizations must be avoided. With the development of general interest in public health matters there has

sprung up in certain quarters an effort on the part of individuals and organizations, for selfish reasons, to disseminate quasi-scientific information that is incorrect, misleading and harmful.

It is, therefore, of great importance that health information and education come from recognized authoritative sources as medical societies, county, State and Federal health agencies, life insurance companies and unofficial specialized health groups.

Through health education each individual will be made to realize the fundamental importance of national health to national happiness and prosperity. He must not only feel that keeping himself in a healthy condition enables him more than anything else to live a successful, useful and happy life, but that in doing so he is fulfilling one of the essentials of good citizenship.

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## THE PHARMACIST'S RESPONSIBILITY IN COMMUNITY HEALTH\*

By E. Fullerton Cook

Chairman of Committee on Status of Pharmacists in Government Service, A. Ph. A.

**I**NTELLIGENT civilization thinks in terms of "better health" when planning for comfort, happiness and even prosperity.

The number of agencies, public and private, directly co-operating in the maintenance or restoration of health, is startling, and the percentage of expenditures for this purpose, a large proportion of the cost of living.

Within the memory of many living men and for the past four thousand years the physician and the pharmacist stood almost alone, shoulder to shoulder, in this struggle against disease.

Today their efforts are supplemented by a vast number of national, State and local organizations including, in Washington alone, more than one hundred Government bureaus with substations in every important centre in the United States and its territories and possessions. In addition there are State and city health boards, food and drug administration bureaus, the Red Cross public health nurses' stations, tuberculosis clinics, baby clinics, physical development insti-

\*Public Health Bulletin No. 2.

tutions and thousands of splendidly equipped hospitals and sanatoriums.

Even the large life insurance companies are urging and freely supplying regular physical examinations for the detection of incipient disease and the popular literature of the news stand advises and inspires more sane living for better health.

In this gigantic program to advance the health of the nation, what part is being taken by the two original factors in public health promotion? It is time that pharmacy should frankly face this question and adjust its plans, if necessary to work in full harmony with the scientific modern forces guiding these most vital activities.

Those controlling the profession of medicine within the field of hygiene, diagnosis, surgery, research into functional and causative forces in normal and diseased tissue, and also in applied, organized medicine may be commended for intense activity and notable advance.

In pharmaceutical manufacture, in the establishment of standardized therapeutic agents, in the production of biological products, and in the synthesis of new organic drugs, the pharmacist is progressive and scientific and may be proud of the accomplishments.

Now, in this modern program, which is not a theory but actually here, what shall be the policy and service which the trained community pharmacist should supply?

Through the working of natural economic laws the pharmacist must find his right place in this development and render a needed service, or automatically he will be eliminated.

First, he must collect, manufacture and standardize in convenient and dependable form those products which have stood the test of clinical and laboratory trial and are known to be valuable therapeutic agents; then he must be trained, equipped and strategically located so that the physician and the public may obtain the prompt dispensing of these medicinals.

Sometimes this service is best rendered in the hospital dispensary, but more often in the pharmacy, privately owned and controlled.

He must also be prepared to supplement the treatment of the physician in the homes of his community by supplying, in addition to prescriptions, those other requisites to modern treatment; sterile solutions, the more simple clinical tests, sickroom supplies, biologicals, etc.

His service to the public directly must also be in harmony with the professional status he assumes when co-operating fully with his physician friends. To maintain this position every one admits the

need for excellent judgment and a well-formulated policy, for the temptation to step outside of the legitimate field of pharmacy into that of medicine is constantly presented.

But here is where pharmacy finds its big opportunity to become an important factor in the national public health program. There are more than 50,000 retail pharmacies in the United States; they are strategically located so as to easily reach those who need help. The traditions of the community are such that the first place to go for advice and help in time of trouble is the drug store. Perhaps this is primarily so because it is free, but it would not continue from generation to generation and become traditional if the type of men in pharmacy during the past had not proved their worth and met the need.

To the pharmacy today the people go for help in sickness and in trouble; the potential possibilities for helping and serving are tremendous, and pharmacy must not now fail in meeting this confidence with wise and trained advice.

The Charters' report, which scientifically studied the demands made upon the practicing pharmacist of today, found that everywhere the public go to the drug store for information—it is how to destroy insects, how to disinfect clothing or an outbuilding, how to pasteurize milk, and a thousand questions that have to do with the problems of living. The real pharmacist is the adviser on questions domestic, political, mechanical, postal and hygienic, and yes, often, therapeutic.

Here is the real problem! Pharmacy and medicine must ultimately reach the answer to this question.

The pharmacist is not qualified nor authorized to recommend medicines for specific diseases. He properly sells simple home remedies the use of which is common knowledge, but there his function in this field ends.

But neither is the physician authorized or qualified to dispense his own medicines; the best thought in medicine acknowledges that the physician who hands out ready-made pills and tablets in his own office cripples his real medical service. Here again there are legitimate exceptions, for the country doctor, miles from a pharmacy, must of necessity carry his medicines.

Why should not pharmacy and medicine face these issues honestly, study the problem and adopt and promote a code of practice which will insure a program and teaching for the best interest of the public health, and that in the long run will surely work for the pros-

perity and growth of a legitimate and virile practice of medicine and pharmacy.

The proposed co-operation of pharmacy and the Public Health Service, through the combined efforts and publications to be issued jointly by the Surgeon General and Editor E. G. Eberle, will be a forward step in this direction.

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## ABSTRACTED AND REPRINTED ARTICLES

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### THE INNER STRUCTURE OF THE ATOM\*

THE GREAT contribution of the nineteenth century to the subject of the structure of matter was the atomic theory, based by Dalton on the quantitative laws of chemical combination. The hypothesis of Avogadro, rejected by Dalton, came to its own half a century later in the hands of Canizzaro, and brought these laws into line with the laws of the physical and chemical behaviour of gases. Now that the atom has proved not to be the ultimate unit of matter, there is a popular impression that the atomic theory has been discredited. The indivisibility of the atom was never a part of the modern theory. The atom remains what it always has been—the smallest portion of an element that is involved in chemical changes. In these changes it is not divided, but that is not to say that it is indivisible. When the acceptance of Avogadro's hypothesis led to the establishment of a consistent system of atomic weights, the way was opened for the discovery of the periodic classification of the elements. Long before the advent of the periodic law Prout had conjectured that hydrogen was the primal stuff of which all the elements were made, though his theory seemed to break down on the evidence of the balance that many atomic weights are not whole numbers, and, later, Crookes, in his speculations on the genesis of the elements, revived the idea of a protyle or primal matter. The atomic theory of the nineteenth century, so far from excluding the compositeness of the atom, had already reached the inference which the researches of the twentieth century have verified.

\*Abstract of an Address given by Dr. James Patrick, Aberdeen University, before the North British Branch of the Pharmaceutical Society. Reprinted from the *Chemist and Druggist*.

### Electrolysis and Conductivity

The exploration of the inner structure of the atom has on the whole been the work of the physicist rather than of the chemist. The first glimpses into the relations of matter and electricity are got from the phenomena of electrolysis. The electricity of the current which passes is regarded as being conveyed by ions, which are positively and negatively charged atoms of the constituents of the electrolyte, travelling in opposite directions through the liquid, giving up their charges at the terminals, and at the same time being liberated there themselves. Faraday's laws of electrolysis are parallel to the laws of chemical combination. In electrolysis we can measure the quantity of electricity,  $E$ , which liberates, say, a cubic centimetre of hydrogen. If  $N$  be the number of molecules in a cubic centimetre,  $2N$  is the number of atoms; and if  $e$  be the charge carried by a single atom, then  $E = 2N \times e$ . The kinetic theory of gases does not give us the value of  $N$  (the constant of Avogadro, as it is called), but there are several ways of estimating it indirectly. From this rough value of  $N$  we can reach a rough value for  $e$ , which is the order of  $10^{-10}$  e.s.u. What we get accurately in electrolysis is the ratio of the charge of the hydrogen atom to its mass. For we can measure the whole current that liberates a cubic centimetre of the gas, and we can weigh that cubic centimetre and so obtain the ratio of the matter and electricity in bulk— $E/M$ . But  $E$  is made up of all the charges of the  $2N$  atoms, and  $M$  is made up of all the masses of the same number of atoms. The unknown  $2N$  cancels out and leaves us with  $E/M = e/m$ . This ratio for hydrogen is about  $10^4$ , if the electricity is measured in e.s.u. Gases are normally non-conductors, but they become conducting when exposed to  $x$ -rays, and in other ways. This conductivity gradually disappears. It can be retained though the gas is transferred from place to place, but it is removed by filtering through cotton-wool, as if it were due to particles of some kind. It is also removed when the gas is passed through an electric field, which shows that the particles are electrified and so drawn to opposite sides of the field. The gas as a whole is neutral, which shows that there are equal numbers of positive and negative particles. The current through a conducting gas is carried by these charged particles, which are called gaseous ions. A gas which has acquired conductivity is said to be ionised. These gaseous ions have one remarkable property, which has proved of extraordinary value. They act as centres of condensation for water-vapour,

and when moist air containing them is expanded a cloud forms upon them, even when the air is dust-free.

### Mass of the Atom

The direct measuring of the charge was achieved by the experiments of Sir J. J. Thomson, and afterwards of Millikan, and the rough estimate of the ionic charge in electrolysis was of the order of  $10^{-10}$  e.s.u. (Thomson's value). Millikan's measured value is  $3.774 \times 10^{-10}$  e.s.u. for the charge on a gaseous ion, so that the two can be confidently identified. Now that  $e$  is known we get an accurate value for  $N$ , the long-sought constant of Avogadro. Not only so, but dividing the mass of a cc. of hydrogen by  $2N$  we get the absolute mass of a single atom of hydrogen, and from that the mass of a single atom of any element, since the relative atomic weights are already known. When a high-tension current is passed through a high vacuum, a stream of particles proceeds from the cathode or negative terminal and produces phosphorescence where it strikes the wall of the tube. The particles are deflected by a magnet in such a way as to show that they are negatively electrified. The laws of the two deflections involve the velocity, the mass, and the charge of the particles, but in different ways. From the measurements we get two equations containing the two unknown quantities,  $v$  and  $e/m$ , and so both of these quantities can be found. The velocity does not concern us, but the value of the ratio  $e/m$  for the cathode particles comes out at nearly 2000 times greater than the corresponding ratio for the hydrogen ion in electrolysis. This means either that the charge is 2000 times greater or that the mass is 2000 times smaller, and the latter proves to be the case. There can be no doubt, therefore, that the charge on the cathode particles is the ionic charge or natural unit of electricity, and it follows that their mass is nearly 2000 times less than the mass of an atom of hydrogen, more exactly about 1835 times less. Here, then, for the first time we have actually got something much smaller than the lightest atom known.

### Ionic Charge

The cathode particle is the same, whatever be the gas in the vacuum tube. It seems to be a constituent of all atoms—a definite sub-atom isolated at last. An electric charge itself possesses inertia, in virtue of the magnetic field produced by its motion, and inertia is only

another name for mass. An electric charge needs only to be concentrated in a sufficiently small space to have as great an inertia as we please. Thomson showed that if the ionic charge were confined to a sphere of  $3.8 \times 10^{-13}$  centimetres in diameter it would have exactly the mass of the cathode particle. This kind of electric inertia remains much the same at moderate speeds, but when the speed is very high, approaching that of light, it increases rapidly, and at the speed of light it would become infinite. Now in the beta particles from radioactive substances we have particles identical with cathode particles, travelling with a wide range of speeds, in some cases reaching 95 per cent. of the speed of light. For these the ratio  $e/m$  diminishes with increasing speed exactly as it would do if the mass were wholly electrical. In other words, the mass increases as the theory requires, and there is no room left for any other kind of mass. Thomson at first called the cathode particles corpuscles, to leave the question of the nature of their mass open, but that term has now been superseded by electron. It appears, therefore, that in so far as matter is composed of electrons, it consists simply of unit charges of negative electricity.

### Electrons

Thomson's corpuscular theory of matter, in its earliest form, assumed that the mass of an atom was entirely due to the mass of the electrons it contained. In a hydrogen atom there would be about 1835 electrons, and in an atom of uranium—the heaviest of all—there would be close on half a million. Even so there would be plenty of room for them all. For the diameter of an atom is estimated on a variety of grounds as being of the order of  $10^{-8}$  centimetres, while the diameter of an electron is of the order of  $10^{-13}$  centimetres, or 100,000 times less. As the volume varies as the cube of the diameter the volume of an atom is  $10^{-15}$ , or a thousand million million times the volume of an electron. The discovery of the electron enables us to understand the process of ionisation in gases. It consists in the detachment of an electron from an atom or molecule, the electron forming a negative ion, and the residue forming a positive one. At ordinary pressures these ions load themselves with additional atoms or molecules, but at low pressures they remain by themselves. The negative electrons travel from the cathode in one direction, while the positive ions travelling towards the cathode is allowed to pass through it by a fine aperture, into a chamber behind, where they are subjected to electric and magnetic fields simultaneously. The result is that all par-

ticles of the same ratio  $e/m$  fall on the back of the chamber on one arm of a parabola, which can be either seen on a fluorescent screen or recorded on a photographic plate. By reversing the magnetic field the parabola is completed, and when the strength of the fields is known the measurement of the parabola gives the  $e/m$  of the particles producing it.

### Radioactivity

The phenomena of radioactivity are important for our purpose, because they exhibit the actual disintegration of atoms and the transformation of elements taking place spontaneously. Some atoms emit alpha particles, which are simply helium atoms, and others emit beta particles, which are merely high-speed electrons. The atom thus broken up becomes an atom of a different element—radium, for example, becoming radium emanation, while the last step of all, the radioactive disintegrations is lead, and at the same time helium is a permanent by-product of all the alpha ray changes. Barkla calculated, from the study of the scattering of  $x$ -rays by matter, that the number of electrons in an atom was about half its atomic weight, the hydrogen atom having probably only one, and Rutherford investigated the scattering of alpha rays by matter. These tracks of alpha particles from radium show that while the particles produce intense ionisation along their paths by knocking out electrons, they encounter nothing massive enough to deflect them in passing through many thousands of atoms. They go through them practically as if they were not there. But they suffer sometimes very sharp deflections. Rutherford experimented with the scattering of alpha particles by thin sheets of various metals and found first that the mass of the atom appears to be concentrated in a very minute nucleus, and secondly that the positive charge on this nucleus is equal to about half the atomic weight. At the same time, since the positive charge balances the negative charges of the electrons the amount of this charge gives the number of electrons revolving round it, so that Barkla's and Rutherford's results are in complete agreement. It was suggested by Van den Broek that the number of units in the central charge might be fixed by the atomic number *i. e.*, the number of the element in the order of the Periodic Table, beginning with hydrogen as 1. For the elements up to calcium this is practically half the atomic weight, while for the higher elements it becomes less than half. As the estimates of Barkla and Rutherford were only approximate, the atomic number theory seemed quite probable, and

it was strikingly confirmed by Moseley's study of the  $x$ -ray spectra of the different elements. These spectra are all very similar, so that line can be compared with line from one to another. Moseley found that taking a particular line its frequency from element to element was connected in a simple arithmetical way with a series of successive whole numbers, and he concluded that these could only represent the number of units in the positive charges of the respective atoms, which thus increase by 1 at each step upwards on the ladder of atomic weights. The atomic number of hydrogen is 1 and that of uranium 92. As 90 elements are now known there are thus only two places in the Periodic Table to fill. The atomic number has a threefold significance. It denotes first the place of an element in the Periodic Table, second the number of unit positive charges on the nucleus of the atom, and third the number of electrons outside the nucleus.

### Electron and Proton

As the hydrogen atom has a single electron and a unit positive charge, its nucleus would appear to be nothing else than the long-sought positive electron, corresponding to the negative electron already known. But in that case it must differ greatly from the negative electron in massiveness, since the mass of a single negative electron is practically negligible, and the whole mass of the hydrogen atom thus belongs to the nucleus. It is natural to suppose that the mass of the positive part of the atom, like the mass of the electron, is due to the electric inertia of its charge. This cannot be proved as in the other case, since we have no hydrogen nuclei or other positive ions with speeds approaching that of light. All we can say is that if the mass of the hydrogen nucleus, or "proton" as it is generally called, is entirely electrical, then its charge must be concentrated on a sphere with a diameter nearly 2000 times less than the diameter of an electron. We have seen that the diameter of the electron is of the order of  $10^{-13}$  cm., and so the diameter of the proton must be of the order of  $10^{-16}$  cm., which is by far the smallest particle that science has discovered or guessed at. If the higher atoms are built up of protons and electrons, it is interesting to consider the structure of their nuclei, and helium is naturally the first example. As the mass resides in the nucleus, and the atomic weight of helium is 4, the helium nucleus must contain 4 protons. But as its atomic number is only 2, the nucleus must also contain 2 electrons to bring down the net or excess positive charge to 2, while there will be other 2 planetary electrons outside the nucleus.

Except in the case of hydrogen the nucleus of an atom is therefore composite, containing both protons and electrons. We have to distinguish the electrons within the nucleus from those which revolve around it. For any atom the atomic weight fixes the number of protons in the nucleus, and the difference between the atomic weight and the atomic number fixes the number of nuclear electrons required to bring the net positive charge down to correspond with the atomic number. Thus in the heaviest atom—uranium—the nucleus would contain 238 protons and 145 electrons, giving a net positive charge of 92. That protons enter into the structure of the nuclei of the higher atoms has been proved by the astonishing experiments in which Rutherford bombarded nitrogen and other elements with swift alpha particles, and succeeded in knocking out of them high-speed particles, positively charged, and satisfactorily shown to be protons, or hydrogen nuclei. Prout's hypothesis turns out to have been near the truth after all. The emission of helium nuclei from radioactive substances suggests that they may exist ready made before their ejection, and in that case protons and helium nuclei would be the building stones of the nuclei of higher atoms.

The relation of the radio-elements to the Periodic Table confirms the view that the atomic number regulates the positive nuclear charge. Take the members of the uranium, thorium, and actinium series arranged in their respective columns, the last five columns being repeated on the left for convenience instead of being continued above. This illustrates the well-known Group Displacement Law according to which an alpha change always results in a product two places to the left, while a beta change results in a product one place to the right. An alpha particle is a helium nucleus with two positive charges, and the loss of it reduces the atomic number by 2. A beta particle is an electron with a single negative charge, and the loss of it is equivalent to the gain of a single positive charge, and increases the atomic number by 1. If the alpha and beta particles come from the nucleus of the disintegrating atom, this law supports the view that the atomic number depends on the nuclear charge, and gives additional evidence for the composite character of the nucleus, since it emits electrons in the beta-rays.

### Isotopes

There is the further fact that these forty or so radio-elements are all contained in twelve places in the table. Some of the places are

thus occupied for the first time, but others of them are already bespoken for ordinary elements like thallium, lead and bismuth. But there are no more places available, and so we are faced with the new idea that the same place in the table may be occupied by different kinds of matter, indistinguishable chemically, but with different radioactive properties, and different atomic weights. Such substances are called isotopes, and on the view of atomic structure we have reached it is quite easy to account for them. For the atomic number is determined simply by the net positive nuclear charge, and if we are not tied to a particular atomic weight, this net charge can be got in more ways than one. If we had only the atomic number of helium, which is 2, to consider, the nucleus might contain 3 protons and 1 electron, or 4 protons and 2 electrons, or 5 protons and 3 electrons, or  $x$  protons and  $x - 2$  electrons, though only the second arrangement would give 4 as the atomic weight. In the 81st place of the table we have isotopes with atomic weights of 204, 206, 208 and 210. We can get the net positive charge of 81 from 204 protons and 123 electrons, or 206 and 125, or 208 and 127, or 210 and 129.

Isotopes, first discovered among the radio-elements, are not confined to them. The first hint of this came when Thomson found that besides the normal parabola for neon there was another indicating an element of atomic weight 22. Aston confirmed Thomson's observation for neon. He found a strong line corresponding to an atomic weight of 20 and a fainter one corresponding to 22. Ordinary neon, with an atomic weight of 20.2, is thus a mixture of these two isotopes. His next discovery was more sensational. Chlorine, with its atomic weight of  $35\frac{1}{2}$ , proved to be a mixture of two isotopes with atomic weights of 35 and 37 respectively. The lines at 36 and 38 represent the two corresponding molecules of HCl. A large number of elements have been investigated in this way. Some have proved to be pure elements, while others have turned out to be mixtures of isotopes. Among others, hydrogen, helium, carbon, oxygen, nitrogen, fluorine and iodine are simple substances, but lithium, neon, chlorine, argon, potassium, calcium, iron, nickel, copper, bromine, silver and antimony have each two isotopes, magnesium, silicon and sulphur have three, zinc has four, selenium, krypton and mercury have six. Tin and xenon have seven. It is clear that the discovery of isotopes involves a considerable revision of the definition of an element. In fact, the word "element" has become ambiguous; but if the word means a substance with a definite atomic number and a definite place in the Peri-

odic Table, chemically distinct from all other substances, though not homogeneous in atomic weight or radioactive properties, then the element of the chemist remains pretty much what it was before. Aston's work shows that, apart from one or two doubtful cases which are being further investigated, all atomic weights come out as whole numbers if that of oxygen be taken as 16. The one prominent exception is hydrogen, which still comes out at 1.008. In the building up of the helium nucleus from 4 hydrogen nuclei there is thus a loss of mass—from 4.032 to 4. According to the more recent views on the relation between mass and energy this implies that the formation of helium from hydrogen has been accomplished by a great output of energy.

### Planetary Electrons

Here our guide is the Periodic Table, and in particular the elements of the zero group. Their inert character indicates that their structure is peculiarly complete and stable. Helium has two electrons outside the nucleus. Neon, as its atomic number shows, has 10, and if it is to resemble helium in having a first shell of 2, it must have a second shell of 8, which we may naturally suppose to be built up by adding one electron at a time as we pass along the elements of the first period. Similarly, argon has 18, and if it is to resemble neon in having an inner shell of 2 and an outer shell of 8, it must have three shells of 2, 8 and 8, the last being again built up by one electron at a time as we pass along the elements of the second period. Krypton comes next after the first long period, with 36 electrons, and if it is to have an outer shell of 8, its third shell must be increased to 18. In passing along the elements from argon to krypton we may suppose that electrons are added one by one either to the new shell or to the one next it. So with the next long period from krypton to xenon. The shells of xenon will then be 2, 8, 18, 18, 8, the additions as we go along being partly in building up the outer 8 and partly in bringing the previous 8 up to 18. The next long period includes the interpolated group of rare earth elements, and brings us to radium emanation, with its atomic number of 86. Here the additions would partly build up a new outer shell of 8, partly bring up the next one from 8 to 18, and partly increase the third from 18 to 32. The last period is incomplete, and leaves us with a partly formed seventh shell. This scheme is partly speculative, but it is speculation on all the facts embodied in the Periodic Table. It is confirmed by much spectroscopic evidence, and it accounts satisfactorily for valency among other things. For

the tendency of atoms would be to approach to the stable types of the zero group by losing or gaining one or more electrons, and thus becoming charged ions positive or negative, the charges being single, double, triple or quadruple, according to the group the elements belong to. Thus sodium might lose an electron and revert to the neon arrangement, chlorine might gain one and advance to the argon arrangement. These monovalent ions would then combine to form a neutral molecule.

### Bohr's Theory

Bohr's development of Rutherford's theory of atomic structure has as its chief object to explain the spectra of the elements, and it has been worked out with complete and astonishing success for hydrogen and ionised helium. The spectrum of hydrogen consists of four series, one in the ultra-violet, one in the visible region, and two in the infra-red. The spectrum shows how a series consists of a number of lines, approaching more and more closely towards the violet end, and converging on a line which terminates the series. Each line, of course, represents a certain wave-length and frequency of vibration. Instead of the wave-frequency, which is the number of waves per second and is very large, it is more convenient to work with the wave-number, which is the number of waves in a centimetre of path. Now the wave-numbers of the first hydrogen series have been found empirically to correspond with great accuracy to the formula

$$109678 \times \left( \frac{1}{2^2} - \frac{1}{\infty^2}, \frac{1}{3^2}, \frac{1}{4^2}, \text{ etc.} \right)$$

those of the second with

$$109678 \times \left( \frac{1}{2^2} - \frac{1}{3^2}, \frac{1}{4^2}, \frac{1}{5^2}, \text{ etc.} \right)$$

those of the third with

$$109678 \times \left( \frac{1}{3^2} - \frac{1}{4^2}, \frac{1}{5^2}, \frac{1}{6^2}, \text{ etc.} \right)$$

and those of the fourth with

$$109678 \times \left( \frac{1}{4^2} - \frac{1}{5^2}, \frac{1}{6^2}, \frac{1}{7^2}, \text{ etc.} \right)$$

The general formula for all the series is thus

$$R \times \left( \frac{1}{n_1^2} - \frac{1}{n_2^2} \right)$$

where R is the number 109678,  $n_1$  is a small integer (and  $n_2$  and other integers greater than  $n_1$  beginning with the nearest above it.

The first difficulty about spectra is that a revolving electron, owing to the continuous change in its magnetic field, ought to be emitting radiation and losing energy all the time, and might be expected to fall at last into the nucleus. The second difficulty is to understand how a hydrogen atom, with only one revolving electron, can emit light of so many different frequencies.

With regard to the first difficulty, since the atom in any case seems to violate ordinary laws, Bohr simply makes it violate them in his own way. He assumes that there are certain permissible orbits in which an electron can revolve without emitting energy at all. Their radii are in proportion to the squares of successive whole numbers—1, 4, 9, 16, 25, etc. The frequency of the light emitted has nothing to do with the frequency of the revolutions of the electron but the electron may be made, by the application of energy from outside, to leave its first orbit, which is the normal one, and follow one of the outer orbits. Then it may jump back from this outer orbit to an inner one. In making this jump it emits radiation of a certain frequency, depending on the energy-difference between the two orbits concerned. At any moment each atom is only passing through one such jump and emitting one kind of light. But in different atoms different jumps are taking place, and so a number of different spectrum lines are produced. The lines of the first series are due to inward jumps from the outer orbits into the first. The lines of the second series by different jumps into the second, and so on. Taking the first series, its line of lowest frequency arises from a jump from the second orbit into the first, the next by a jump from the third orbit, and so on, the limiting line of highest frequency being due to a jump from infinity. Similarly the lines of the second series would be caused by jumps from the third orbit to the second, the fourth to the second, and so on. Now it can be shown quite simply that the energies of the different orbits are proportional to the fractions  $\frac{1}{4}$ ,  $\frac{1}{9}$ ,  $\frac{1}{16}$ ,  $\frac{1}{25}$ , etc., and the energy differences proportional to the differences between these fractions.

### Planck's Constant

Bohr assumes further, and this is the real starting-point of his theory, that the frequency of the light emitted is proportional to the energy difference of the orbits, and that the particular proportion is expressed by the quantity known as Planck's Constant, which is characteristic of the new quantum theory of radiation. Not only so, but

granting the assumption about Planck's Constant, it becomes possible to calculate the whole-number part of the formula, and the result is surprisingly close to the empirical figure. On the same supposition the dimensions of the orbits, the velocity of the electron, and its frequency of revolution, can also be deduced. There is another theory, that of Lewis and Langmuir, which deserves mention because, though it gives no account of spectra, it endeavours to elucidate the facts of chemistry. It says nothing about the inner structure or state of motion of the atom, but confines itself to the external shell of eight or fewer electrons. These are supposed to be relatively fixed. In a complete octet they form the corners of a cube. In the case of polar compounds or electrolytes, one atom may lose an electron and another may gain one, and the two will then be held together by their electrical attraction. In the case of non-polar compounds, atoms combine by sharing a side or a face of a cube, and thus completing the octet formation for each. Whatever may be said of this theory, the final theory of the atom must cover the chemical facts as well as the physical ones.

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## MEDICAL AND PHARMACEUTICAL NOTES

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A CENTENNIAL REMINISCENCE—The *Journal de Pharmacie et de Chimie*, one of our most welcome exchanges, is now in its one hundred and twentieth year, and publishes from time to time items from its earlier issues, under the title "Il y a cent ans," "one hundred years ago." In the issue just at hand (8th ser. v. 7, 1928, 147) it gives a note from the issue of February, 1828, on the detection of small amounts of opium. This is by the well-known meconic acid test, but the special interest is that it is credited to R. Hare, M. D., probably the eminent Philadelphia chemist. The item as published does not indicate the source.—H. L.

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COMPOSITION OF HUMAN MILK—The variation in the composition of human milk with the period of lactation has been considered by several workers. The consensus of opinion is that the percentage of fat increases as the lactation advances, whilst at the same time there is a diminution of the protein and ash.

Period of lactation	Fat Per Cent.	Proteins Per Cent.	Lactose Per Cent.	Ash Per Cent.
1 to 7 days	3.0	2.1	6.8	0.30
7 to 28 days	3.5	1.6	6.8	0.25
1 to 9 months	3.5	1.3	6.9	0.22

(*Analyst*, Feb., 1928.)

ERYSIPELAS COMES UNDER MEDICINE'S CONTROL—Erysipelas may now be added to the list of diseases vanquished by man, Dr. Konrad E. Birkhaug, of the University of Rochester School of Medicine, told the American College of Physicians recently.

As a result of four years of work, Dr. Birkhaug has developed an antitoxin treatment for use in the early stages of erysipelas that gives results commensurate with those obtained through the use of diphtheria antitoxin in the early hours of that disease.

The erysipelas treatment reduces to half the time that the patient must spend in the hospital, Dr. Birkhaug told the doctors. The mortality in adults has been reduced from 12 to only 4 per cent., while recurrent attacks of erysipelas have been prevented through a course of immunization through the use of toxin.

Dr. Birkhaug observed in 1924 that nine-tenths of the streptococci associated with the disease were of a specific type. This form of organism had been suspected of the crime of causing erysipelas when it was discovered in the lesions of the disease in 1881. The production of the disease experimentally in animals and their protection with a specific antiserum confirmed Dr. Birkhaug's idea that the particular kind of streptococci observed was the cause of the disease. The next year he discovered the toxin produced by the streptococci and then in 1926 erysipelas antitoxin was produced. The evidence for erysipelas specificity has been confirmed by other laboratories since Dr. Birkhaug's pioneer work.—(*Science Service*.)

LEPROSY DRUG NOW ADMINISTERED PAINLESSLY—A new combination of chaulmoogra oil with benzocaine has enabled several lepers at the National Leprosarium in Carville, La., to receive the benefits of the curative drug with a minimum of pain.

The discomfort which accompanies the administration of chaulmoogra oil is a problem with which the specialists in leprosy have struggled for years. Consequently the success which has attended

the use of benzocaine-chaulmoogra oil by Dr. Frederick A. Johansen, of the United States Public Health Service, on twenty-four lepers at the leprosarium may mark an important step forward in the treatment of this ancient disease.

"This preparation has the advantage of not causing pain, and of absorbing readily," Dr. Johansen stated, "thereby giving the patient a uniform amount of chaulmoogra oil over a definite period of time. Since the treatment was started thirty-six patients have been added, making a total of sixty who are taking the injections semi-weekly as routine treatment.

"In reporting these cases," added the surgeon, "no claim is made that the injection of chaulmoogra oil with benzocaine will cure leprosy. It is felt that the method suggested is worthy of further use and such trial as may seem appropriate."—(*Science Service.*)

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## NEWS ITEMS AND PERSONAL NOTES

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### UNITED STATES CIVIL SERVICE EXAMINATION

The United States Civil Service Commission announces the following open competitive examination:

#### CHIEF OF DRUG CONTROL

Applications for chief of drug control must be on file with the Civil Service Commission at Washington, D. C., not later than March 27.

The examination is to fill a vacancy in the Food, Drug and Insecticide Administration, Department of Agriculture, Washington, D. C., and vacancies occurring in positions requiring similar qualifications.

The entrance salary is \$5200 a year. A probationary period of six months is required; advancement after that depends upon individual efficiency, increased usefulness, and the occurrence of vacancies in higher positions.

The duties are primarily administrative. The Chief of Drug Control must direct the work involved in enforcing the terms of the Federal Food and Drugs Act as they apply to drugs and medicines. This involves not only the supervision of the personnel of the Drug Control Unit, consisting of approximately twenty-two people, includ-

ing medical officers, chemists and pharmacologists, but also responsibility for the operations of the field force in applying the law to interstate shipments of drug products. His primary business will be a determination of the policy to be adopted in the law enforcement work on drugs, the particular projects to be engaged in during any specific period, to determine what cases are sufficiently flagrant to warrant prosecution and to maintain contact with the latest developments in the drug manufacturing industry and in medical science. There will be a great many direct contacts with representatives of the industry itself, requiring a display of tact, firmness and good judgment, so that it is essential that a man of strong personality be secured.

Competitors will not be required to report for a written examination at any place, but will be rated on their education, training, and experience.

Full information may be obtained from the United States Civil Service Commission at Washington, D. C., or the secretary of the United States Civil Service Board of Examiners, at the post office or custom house in any city.

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FOUNDERS' DAY AT THE NEW COLLEGE—Even more important than the celebration of the completion of the first century of service by the Philadelphia College of Pharmacy and Science was the celebration of the one hundred and seventh anniversary of Founders' Day, February 23, 1928.

This was true in the opinion of the board of trustees, Dr. Wilmer Krusen, the new president, and hundreds of alumni who attended one or all of the three festivities that marked the day, because the new building at Forty-third Street and Woodland Avenue was dedicated that day, and because a greater number of alumni expressed enthusiasm and interest in the proceedings than had responded to any series of events in the history of the college.

Dr. Krusen presided at the dedicatory exercises on the afternoon of Founders' Day, at which the Honorable Hampton L. Carson, former Attorney General of Pennsylvania and son of Dr. Joseph Carson, for many years a professor at the college, and the Honorable Harry A. Mackey, Mayor of Philadelphia, were the chief speakers. Joseph W. England, chairman of the board of trustees, was master of ceremonies in the evening of the same day, when a score and more medical and pharmaceutical leaders of the country made brief talks. The three-fold exercises concluded Friday night, February 24th, with an

alumni house-warming, during which more than 500 alumni and their friends inspected the new college. Mrs. Bertha L. De Graffe Peacock, president of the Alumni Association, was chairman of the Hostess Committee; Mrs. William E. Lee, president of the W. O. N. A. R. D., assisted her. Readings were given by Mrs. Ada S. Capwell, librarian of the college.

Mr. Carson's address sparkled with epigrams and amusing stories such as only the son of a great doctor could know. When he singled out Dean Charles H. LaWall and Dr. Krusen for individual praise for their constructive work in the college, a thunder of approving applause broke among the tiers of seats occupied by the present student body, throwing the two leaders into an embarrassed but pleased confusion.

A detailed report of the occasion will be presented in the April issue of the JOURNAL.

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## BOOK REVIEWS

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LABORATORY MANUAL FOR THE DETECTION OF POISONS AND POWERFUL DRUGS. By Dr. Wilhelm Autenrieth, translated by William H. Warren, Ph. D. Sixth American Edition from the Fifth German Edition, completely revised with extensive additions. P. Blakiston's Son & Co., Philadelphia. Price \$6.00.

To make an indispensable work still more valuable than it has ever been before is a high achievement for an author and a publisher to attain, but that this has been accomplished in the latest edition of "Autenrieth and Warren," as it is usually called in the laboratories where it is used, will be admitted by every one who needs and uses such a book as this.

Within a period of a little over ten years this well-known guide to the analyst, particularly in cases which have a legal and sometimes a sinister aspect, has increased from a little over 300 pages to nearly 700 pages. In the new edition, which is here under consideration, every chapter has been practically rewritten, with the exception of Chapter III dealing with metallic poisons, in which few changes have been necessary.

Many inorganic compounds have been discussed in Chapter IV which had not appeared in earlier editions, such as fluorides, bromides, iodides, sulphides, sulphur dioxide, boric acid, chlorates, and nitrites.

The synthetic hypnotics and sedatives are given much space and many are discussed which are but little used in this country as yet. As an example of the increase in valuable information and details one needs but to compare the references on aconite and its alkaloids in the present volume with the similar section in an earlier edition.

Among the poisons discussed for the first time in this work are arecoline, yohimbine and lobeline. The consideration of digitalis and its principles has been enlarged from two to twelve pages. These comparisons will give some idea of the improvements in this new edition. One must handle the work and study it, however, to appreciate its excellence, which cannot be adequately communicated through the medium of a review.

Chapter V, which deals with apparatus, special methods of examination and special examinations, comprises more than 100 pages in the new book, and will be especially appreciated, as it contains a wealth of material not found within the covers of any other single work.

The author index and subject index are particularly comprehensive and valuable.

The work is undoubtedly *ne plus ultra* in its field and should have an extensive sale as a reference work as well as a laboratory manual.

CHARLES H. LA WALL.

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AUS DER GESCHICHTE DER PFLANZENWELT IN WORT UND BILD. By Hermann Peters. 8vo., 176 pages, numerous illustrations and portrait. Arthur Nemayer, Mittenwald, Bavaria.

Hermann Peters, who contributed largely to botanical literature, died in 1920. The publication of his last work was only possible lately through the efforts of the (German) Society of History of Pharmacy. A very attractive and interesting volume has been produced.

Plant folk-lore is extensive, and as with other phases of folk-lore, shows many extravagant and extraordinary features. It is somewhat remarkable that though the Hebrew Scriptures teach emphatically that man is a special creation in special form, instances are not lacking of a feeling of community with the other living beings. The story of Balaam and the fable of Jotham are instances. Jotham's fable tells of the efforts of the plants to get a ruler. The olive, fig and vine refuse the crown, but the bramble accepts.

The text of the book is very extensive and includes many types

of plants. The literature has been carefully searched. The plants are, as might be expected, given with their German folk-names, but systematic titles are used sufficiently for botanists of other nationalities to get the clues. Yet it would have been better if more of this information had been given. Numerous illustrations add greatly to the usefulness of the book. These are from pen drawings by Marie Heumann. A rather gruesome illustration accompanies the article on the mandrake. This plant, as is well known, was the subject of many very peculiar superstitions. It was believed that when it was torn out of the ground it made such a terrible cry that "living mortals hearing it go mad." The illustration shows the stem of the plant tied to the tail of a dog, but the artist has introduced a feature that has no concern with the mandrake, but was probably not infrequent in the open country during those "centuries of crime and prayer" which we call the dark ages. The story of the aspen with its trembling leaves is given in two forms, both relating to the New Testament narrative. In the article on the pines, Heine's well-known lyric is quoted, and an account is given of the origin of the "Christmas tree," which originated in Germany and is now so widespread. It is stated that the earliest notice of the custom so far found is in the first decade of the seventeenth century. Reference is also made, as might be expected, to the folk-poem, "O Tannenbaum," the air of which has become familiar to Americans not only by its translation for a Christmas hymn, but also in the Confederate anthem, "Maryland, My Maryland."

Poetry is extensively quoted in the book, and the prose is brilliant and vigorous. Coincidences between the expressions of German and English poets are noted. Lines, for example, about the sunflower show that the poets of both nations have accepted the legend that the flower turns to the sun at rising and setting.

It would have been interesting if the author had taken up the folk-lore of the hazel, which would probably have led to a discussion of that curious and much-disputed use of the divining-rod (Wuenschelrute). The author of a recently published fasciculus of Abderhalden's "Methoden" (covering the subject of analysis of mineral waters) gave some space to this problem, but reached no positive conclusion.

Hermann Peters has given to the world in this volume a most interesting collection of plant legends. The publisher has issued it in excellent form, and the Society of History of Pharmacy is to be thanked for undertaking the printing.

HENRY LEFFMANN.

HANDBUCH DER BIOLOGISCHEN ARBEITSMETHODEN. Edited by Geh. Med-Rat Prof. Dr. Emil Abderhalden. Fasc. 251 and 252, 11 marks. Urban and Schwarzenberg, Berlin. 1928.

FASCICULUS 251, ZUSAMMENSTELLUNG DER TOXISCHEN AND LETALEN DOSEN FÜR DIE GEBRÄUCHLICHSTEN GIFTE UND VERSUCHSTIERE. Prepared by Ferdinand Flury and Franz Zernik, of Würzburg. 7 marks.

The volume contains an immense mass of information concerning the effects of many poisons on the animals commonly used in laboratory experiments. It is, of course, always to be considered how far such data may be useful in the general practise of toxicology. Apart from the fact that the lower animals are not equally susceptible with human beings to some poisons, the physician called to attend cases of poisoning finds himself often very imperfectly informed as to the amount taken and other important conditions. As to what is the fatal dose of a given poison is a question often asked, but to which rarely a positive answer can be given. For many years a British case was cited to show that two grains of arsenous oxide may be a fatal dose, but Dr. Witthaus examined the original report and showed that the amount taken was not absolutely determined and that it was not entirely sure that death was due to arsenic. The information contained in this fasciculus will be of interest and value to pharmacologists. The work has been done thoroughly and carefully, showing a great deal of patient labor.

HENRY LEFFMANN.

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FASCICULUS 252, UNTERSUCHUNG UND WERTBESTIMMUNG VON MINERALWÄSSERN UND MINERALQUELLEN. By H. Klonka, of Jena. 11 marks.

This volume is a comprehensive and thorough treatise on the whole subject of mineral waters, covering this important department of applied chemistry in all its bearings. Geologic conditions of the different types of springs, the sources of waters, deep and subsoil, the several views as to the passage of the water through the subterranean strata and the nature and probable cause of intermittent springs are among the topics presented in the preliminary part. Then follows detailed accounts of the sources of the more important ingredients. The seeking of water is taken up, and in this connection a short essay

is given on the divining-rod. It does not appear that a definite opinion has been obtained by the German author any more than with the investigators of other nations.

The work is liberally illustrated and the analytic processes given in great detail. An interesting feature is the portion devoted to the detection and determination of radioactivity.

The chemist engaged in the analysis of natural waters, especially waters having or claiming therapeutic properties, will find in the work a safe and thorough guide.

HENRY LEFFMANN.

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ALLEN'S COMMERCIAL ORGANIC ANALYSIS. 5th edition. Vol. VI, Colorimetry, Dyestuffs and the Analysis of Coloring Matters. Edited by Samuel S. Sadtler, Elbert C. Lathrop and C. Ainsworth Mitchell. 8vo., ix-658 pages. Philadelphia, P. Blakiston's Son & Co. 1928. Price \$7.50.

C. O. A. blooms perennially. The apt title that the author gave it remains the most suitable. Five editions of the work have been placed before practical chemists and the interest is not abated. It is true that the progress of science has rendered changes necessary, but the framework remains as the author constructed it.

The present volume is devoted to the dyestuffs, mostly, of course, the artificial forms. The book is crowded with information and offers a most opportune and serviceable compendium of the present knowledge of that vast field that has been developed since the middle of the last century under the stimulus of the theories of structure of the cyclic compounds, and the patient work of research chemists. Much of this work has been done, of course, under economic influence, but by no means entirely. Pure research, search for the truth for truth's sake, has been a prominent characteristic.

The compounds covered by the volume are principally of German origin, that nation having been the most active for many years in the development of coal-tar derivatives and by a co-operation of theory and practise it has accomplished wonderful results.

Four collaborators have contributed the matter in the book. W. A. Gallup, North Adams, Mass.; A. W. Joyce, of New York City, and Hans Edward Fierz-David, of Zürich, with whom is associated V. E. Yarsley. Dr. Fierz-David contributes an article on "Dyes and Coloring Matters," and, in association with Dr. Yarsley, the arti-

cle on the analysis of such materials. Dr. Gallup gives a general review of the present-day methods of colorimetry. It is not stated whether the text of Dr. Fierz-David's personal contribution was submitted by him in English or is the result of translation. If the former, we can easily overlook an occasional error in form. Few English-speaking chemists could do as well if writing in German, but if the original text has been translated there has not been full editorial supervision.

On the title page it is noted that the text represents that of the fourth edition revised and partly rewritten. The subject-matter is of such extent and complication that most chemists who are not directly concerned in it have but little interest, but enormous industries have been developed in connection with color manufacture, and a highly specialized work of this type is a necessity for those engaged in the manufacture or use of the products.

The work fully sustains the standard that C. O. A. has always sought and attained, and its publication will be gratefully noted by a large number of chemists and manufacturers, as well as food analysts who have nowadays so much to do with colored foods and confections. It is fortunate that a very considerable number of the possible colors have found as yet no practical use and may be ignored in the general routine of analysis. Undoubtedly the preparation of the several contributions and the editorial supervision has entailed a great deal of work for which the authors and editors deserve thanks. The publisher has done full justice to the text and the result is a volume of valuable matter in excellent form.

HENRY LEFFMANN.